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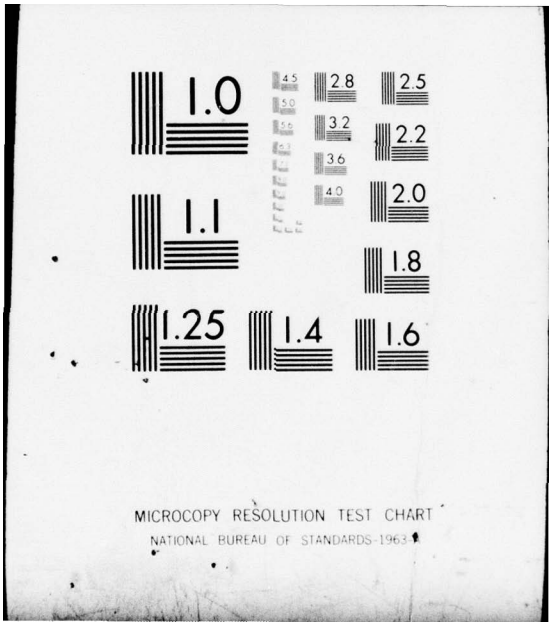
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AIR FORCE COMMUNICATIONS SERVICE

TRACALS EVALUATION REPORT

VORTAC Station Evaluation Report

Wright-Patterson AFB, OH

77/66N-89

Evaluation Period 15-21 March 1977

DEPARTMENT OF THE AIR FORCE
1866 Facility Checking Squadron (AFCS)
Richards-Gebaur AFB, MO 64030

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Wright-Patterson AFB, OHIO

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Evaluation Period 15-21 March 1977.

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ABSTRACT

This report presents the results of the 15-21 Mar 1977 evaluation of the Wright-Patterson AFB AN/FRN-32A VORTAC and associated power systems. The evaluation was conducted to observe the facility in its installed environment and to determine its capabilities and limitations. Results show that the facility is capable of satisfying the users' requirements. Recommendations are made for improvements. The results obtained can be used as a guide to anticipated performance until there is a significant change in either ground equipment, siting, or screening.

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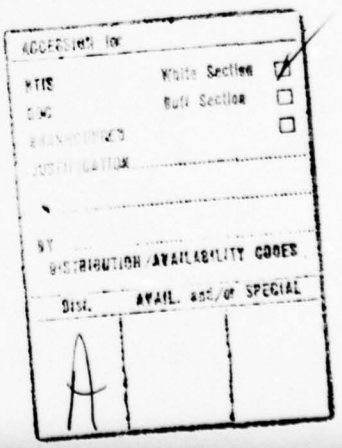

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1. SUMMARY

1-1. TACAN

a. Ground Evaluation Results: Transponder one was removed from service due to the transmit frequency being out-of-tolerance. Receiver one's eight microsecond decoding was out-of-tolerance, but a pending change in this specification will eliminate this problem. Transponder two and associated equipment were operating satisfactorily with the exception of the A-7 monitor which was inoperative for parts.

b. Siting Evaluation Results: Flat grass-covered ground surrounds the VORTAC, providing large reflecting areas conducive to the formation of vertical nulls. No significant deterioration of course structure occurs in the nulls, however, because of the excellent characteristics of the GRA-120 antenna. Horizon screening is relatively low at all azimuths except to the northwest, where coverage is slightly reduced by elevation angles of as much as 1.5°.

c. Flight Evaluation Results

(1) Alignment Accuracy: Alignment orbits resulted in a maximum error spread of -0.4° to +1.0° on transponder one and -1.3° to +1.6° on transponder number two. Average alignment errors were +0.25° and +0.20°, respectively, and +0.5° on both transponders at the reference checkpoint. The TACAN satisfies the AFM 55-8 requirement that all radials must be within 2.5° of the correct magnetic azimuth.

(2) Course Structure: Course structure on all radials was extremely smooth, with a nominal roughness value of approximately 0.2°. Isolated increases in roughness occurred in association with several minor nulls, but these were not of sufficient magnitude to limit TACAN service.

(3) Coverage: An elaborate coverage prediction procedure, which accounts for refraction and anomolous propagation effects, was applied in the analysis of coverage data. Measured coverage exceeded predicted coverage by an average of 1% using this method. This validated prediction technique was then used to develop coverage charts. Solid coverage is provided well beyond the required service volume, and the TACAN is fully capable of satisfying all current mission requirements.

(4) Interference Field Pattern: Nulling on the 232° approach radial was insignificant. Vertical nulls measured on the 047° approach radial coincided closely with nulls predicted by a computer model. Although these nulls have significant depth, only slight increases in course roughness occur in the nulls, and there is no

appreciable deterioration of TACAN service. These nulls are caused by reflections from the large flat area to the northeast and can not be reduced or eliminated by equipment maintenance.

(5) Approaches and Missed Approaches: TACAN service is excellent on all holding patterns, arcs, approach radials, and missed approaches except for areas of slight roughness at 8.6 NM/2200 feet MSL and 5.4 NM/2000 feet MSL on the 047° approach radial. These rough areas are caused by nulls, as discussed above.

1-2. VOR

a. Ground Evaluation Results

(1) Sideband VSWRs on both transmitters were out-of-tolerance. This was the result of 2046 Comm Group tuning the antenna to compensate for temperature variations. AFCS has performed a study, however, which determined that tuning the antenna for best SWR is the preferred method.

(2) The ground error spread of transmitter one was out-of-tolerance. The antenna was retuned by 2046 Comm Group and the error spread reduced to a satisfactory level.

b. Siting Evaluation Results: Performance indicates the VOR is nearly ideally sited. The flat, smooth ground around the site is preferred for VOR, resulting in excellent course structure, except within the restricted area. It is believed that the restriction defined in the IFR supplement is caused by reflections from hangar 206, although this belief could not be deterministically proven.

c. Flight Evaluation Results

(1) Alignment Accuracy: Initial ground checks revealed an out-of-tolerance error spread on transmitter one and this was confirmed by airborne orbital measurements. Equipment adjustments by local maintenance personnel were successful in bringing the errors within tolerance. Final airborne error spreads were 2.8° on transmitter one and 2.6° on transmitter two, and both ground checks were satisfactory. Average alignment errors were 0.93° on transmitter one and 0.86° on transmitter two. All final radial alignments satisfied AFM 55-8 requirements.

(2) Course Structure: Course structure is exceptionally smooth throughout the coverage volume except within the region from 340°-010° below 3000 feet MSL. This area is restricted because of large amplitude scalloping which appears on radial tracks. Analysis strongly indicates that this scalloping is caused by reflections from hangar 206, but this theory could not be proven conclusively.

(3) Coverage: Solid VOR coverage is provided well beyond the limits of the required service volume. Plots are contained in the report which depict the exact limits of useable coverage at 30,000 feet MSL, and may be extrapolated to provide coverage data at other altitudes of interest.

(4) Approaches and Missed Approaches: Scalloping of up to 3.0° was measured at 13 NM/3000 feet MSL on the 050° missed approach radial. These aberrations are beyond the 10 NM range within which the missed approach is executed. Except for this minor problem area VOR support of all applicable instrument approaches is fully adequate.

2. RECOMMENDATIONS

2-1. TACAN

a. Recommend the replacement crystals for both transmitters be carefully checked for frequency accuracy prior to returning the transmitter to service (reference paragraph 5-3b).

b. Recommend the receiver one meter switch be replaced (reference paragraph 5-3a).

c. Recommend replacement of the receiver two IF amplifier to correct alignment and squitter problems (reference paragraph 5-3a).

d. Bias potentiometer R1211 on transponder two needs replacment to enable smooth adjustment of klystron bias (reference paragraph 5-3b).

2-2. VOR: Recommend that 2046 CG retune the VOR antenna such that the sideband VSWRs are within tolerance (reference paragraph 6-3d).

3. GENERAL INFORMATION

3-1. Facility Data

a. General

Location: Wright-Patterson AFB, OH (TAB A-1-1)
Unit: 2046 Communications Group
Area: Northern Communications Area
Evaluation Period: 15-21 March 1977

b. VORTAC

Site Coordinates: 39° 49' 05.017" N
84° 03' 16.796" W
Site Elevation: 805.69 ft MSL
Frequency: 115.2 MHz/Channel 99
TACAN Antenna Height: 34 ft AGL

3-2. Airfield/Runway Data

Airfield Elevation: 824 ft MSL
Airfield Coordinates: 39° 49' 34.3" N
84° 02' 53.8" W
Magnetic Variation: 2.19° W

Wright-Patterson active runway is 05/23. Dimensions of the runway and the location of the VORTAC facility are shown in TAB A-3-1.

3-3. Mission Area of Responsibility: Wright-Patterson is a radio class (T) BVORTAC, required to provide solid coverage within a 25 NM radius/12000 ft MSL protected service volume. Two high and three low altitude approaches are provided to runway 05/23, as are missed approach procedures, holding patterns, and DME arcs to final. TABs A-2-1/5 depict the published instrument approaches. The low altitude enroute chart for the surrounding areas is shown in TAB A-1-2.

3-4. Primary Using Agencies/Aircraft Supported: Wright-Patterson ATC facilities support EC-135s assigned to ASD, T-39s, transient aircraft and the local Aero Club. In addition, the base serves as headquarters for Log Air, flying primarily DC-9s and the civilian version of the C-130.

3-5. ATC Facilities: The Wright-Patterson ATC system is composed of a VFR control tower with BRITE II, VORTAC, SSILS, PAR and ASR. With the exception of the ASR (RAPCON), which is operated by FAA, all of these facilities are Air Force operated. Dayton Approach Control is divided into two service sectors, Dayton and Patterson. The Dayton sector provides IFR approach/departure to several adjacent civil

airports, including Dayton Muni, Richmond, Sidney, Piqua and Darke County. Wright-Patterson, Springfield, Hooke (Middleton), Montgomery County and Greene County are supported by the Patterson sector. In addition, stage III radar service is provided for Dayton Muni and Wright-Patterson AFB.

3-6. Logistics Support: Calibration and repair of test equipment is performed by Wright-Patterson AFB PMEL.

3-7. Key Personnel

a. Ground Evaluation Personnel

Capt Geoffry S. Howard, Electrical Engineer/Team Chief
MSgt Donald R. Ferguson, Evaluation Technician
MSgt Felix D. Young, Evaluation Technician
MSgt John R. Ramsey, Evaluation Technician
SSgt Danny R. Cartee, Evaluation Technician
AlC Stephen F. Jurash, Surveyor

b. Airborne Evaluation Personnel

Capt Alan L. Rust, FLight Inspector/Aircraft Commander
Capt John R. Barrett, Pilot
MSgt Lynn L. Dillingham, Flight Inspection Technician
MSgt Joseph E. Lee, Flight Mechanic
MSgt Jackie L. Sollers, Flight Inspection Technician
SSgt John W. Blank, Flight Inspection Technician

c. Personnel Contacted (2046 Comm Gp)

Col William M. Rainwater, Commander
Lt Col Richard K. Rathbun, Vice Commander
Maj Charles C. Aplin, Chief of Maintenace
MSgt Thomas H. Fries, NCOIC NAVAIDS Work Center
Mr. James J. Walther, GS-11, North Comm Area

4. PROPAGATION CLIMATOLOGY

4-1. Introduction: The information in this chapter is provided for a seasonal assessment of the probable weather conditions at Wright-Patterson AFB, Ohio, and to emphasize the importance of weather effects on TRACALS.

4-2. General Considerations: The mean daily minimum temperature at Wright-Patterson AFB is 22 degrees in January, and the mean daily maximum for the summer is 85 degrees in July and August. Prevailing winds are from the west in the winter months, and from the south to southwest during the rest of the year.

4-3. Seasonal Climatology

a. Strong, rapid moving fronts occur frequently during the winter season. During the coldest part of the year dry air is predominant over the region. In the fall and winter it is often characterized by strong subsidence aloft. When the comparatively warm moist air from the southwest overrides the cold dry air, a moderate to strong subrefractive layer is often formed in the vicinity of the mixing zone of the two air masses. These systems are often associated with storms originating in Colorado.

b. During the summer months the site should experience the maximum amount of superrefractive conditions, due to the warmer temperatures and the addition of low level moisture. The refractive profile becomes superrefractive with nightime cooling, and standard to subrefractive with daytime heating. Nights of clear skies and calm winds are favorable to the formation of low level ducts. These tend to dissipate soon after sunrise. Low level moisture and upper level subsidence, which occur frequently during this season, create ideal conditions for the formation of strong superrefractive layers aloft. Usually they are elevated enough so that the angle of penetration of the rays prevents trapping.

c. The spring and fall seasons serve as transitional periods between the maximum occurrence of superrefractive conditions during the summer and the more standard propagation conditions characteristic of the winter.

4-4. Refractive Conditions: The chart "Frequency of Refractive Conditions in Percent" (TAB G-1) is derived from summaries of atmospheric refractive index prepared by the USAF Environmental Technical Applications Center (AWS). It was computed from the nearest rawinsonde station considered to be representative of this site. The chart represents a count by month, over the period of record of three or more years, of the minimum gradient category in percent frequency of occurrence. Only the

one minimum gradient category in each upper air sounding has been counted. For this reason subrefraction is seldom shown on the chart, as more negative gradients will usually be found and counted. A description of the refractive index categories and their corresponding gradients in "N"-units per 1000 feet follows:

TRAPPING-Refractivity decreases with height. Rays curve downward more sharply than the curvature of the earth's surface. Radio/radar performance is greatly disturbed, ranges are greatly extended, radar holes appear. Occurrence is not normally frequent. Gradient less than or equal to -48/1000 feet.

SUPERREFRACTIVE-Refractivity decreases with height. Rays curve downward more sharply than normal but not as much as the curvature of the earth's surface. Radio/radar ranges are significantly extended. Occurrence is frequent. Gradient between -24/1000 feet and -48/1000 feet.

NORMAL-Refractivity decreases with height. Rays curve downward but not as sharply as with superrefractivity. Radio/radar performance is generally undisturbed. Occurrence is frequent. Gradient greater than -24/1000 feet and less than 0/1000 feet.

SUBREFRACTIVE-Refractivity increases with height. Ray curvature is less than normal. Radio/radar ranges are significantly reduced. Occurrence is quite rare. Gradient greater than or equal to 0/1000 feet (positive gradient).

5. TACAN

5-1. Equipment Details

a. General

(1) The AN/GRN-20C TACAN facility consists of three basic equipment groups: the receiver-transmitter group, the antenna group, and the control monitor group. The receiver-transmitter group consists of a coder monitor (coder indicator), a radio receiver, a radio set control, an amplifier-modulator, a frequency multiplier-oscillator (FMO), and three associated power supplies. The antenna group consists of a low or high band antenna and an antenna control unit. The control-monitor group consists of an antenna switching unit, a local control drawer, two radio frequency monitors, and built-in test equipment. A remote unit is provided which allows monitoring and control of the equipment.

(2) TACAN facilities operate in the 962 to 1213 MHz frequency range with a total of 126 channels available. The first 63 channels, 962 to 1024 MHz with 1 MHz channel separation, are known as the low band. The low band receiver operates 63 MHz above the selected transmitter frequency. The remaining 63 channels, 1151 to 1213 MHz with 1 MHz spacing between channels, are known as the high band. The high band receiver frequency is 63 MHz below the selected transmitter frequency.

(3) A TACAN is capable of providing distance information to approximately 95 properly equipped aircraft and azimuth information to any TACAN equipped aircraft in the area of coverage. Distance information is limited to a maximum range by the airborne indicator and by signal strength. Azimuth information is limited only by signal strength.

(4) Acquisition of distance information is initiated by a transmitter in the aircraft. Distance interrogation pulses are transmitted from the aircraft with a repetition pattern peculiar to the airborne transmitter. Reception of these distance interrogation pulses by the ground TACAN station causes the transmission of a series of reply pulses with the same repetition pattern. The aircraft receives the reply, measures the time elapsed between the transmission of the interrogation pulse pairs and the receipt of the reply, then converts this elapsed time into equivalent distance information.

(5) Azimuth information is transmitted by modulating the antenna radiation pattern through rotation of parasitic elements in the antenna and by transmitting reference pulse pair groups. The aircraft determines its bearing by comparing the phase of the reconstructed modulation envelope with the time occurrence of the reference pulse pair groups.

b. Special: The Wright-Patterson TACAN operates on channel 99, receiving interrogations on a frequency of 1123 MHz and replying on a frequency of 1186 MHz.

5-2. Facility Equipment

TACAN Transponder One: AN/GRN-20C, Serial Number 18
TACAN Transponder Two: AN/GRN-20C, Serial Number 40
Monitor: AN/GRA-111, Serial Number 313
Antenna: AN/GRA-120, Serial Number 017

5-3. Equipment Status: TACAN equipment checks were performed in accordance with AFCSP 100-61, Volume XVIII. Detailed results are found in TABs E-1-1/2. Oscilloscope photographs are depicted in TABs D-1-1/2. TABs E-4-1/3 contain results of pre and post airborne evaluation equipment checks. Environmental conditions inside the shelter are plotted in TAB E-3.

a. Receivers: The bandwidth of receiver number one was initially measured as 1.2 MHz. After alignment the bandwidth was 1.8 MHz. Athough this figure still does not meet TO standards, it is more acceptable. Eight micro-second decoding of receiver one was out-of-tolerance, being only 43 dB down instead of 50 dB as required by the TO. No action was taken to correct this problem as a revision to the TO which will change this tolerance from 50 dB to 30 dB was pending. This TO change has since been effected. Receiver one also had an erratic meter selector switch. A replacement was ordered. The initial bandwidth of number two receiver preamplifier was 3.5 MHz and it was aligned off-channel. Maintenance aligned the preamplifier, but was unable to obtain an on-channel response with the correct bandwidth. It was determined that the IF unit was aligned off-channel and was causing the problem with the preamplifier. An IF unit was placed on order.

b. Transmitters: Transponder one crystal frequency was out-of-tolerance. A replacement crystal was placed on order. The auxiliary reference burst count was out-of-tolerance high. R634 and R656 were replaced in the coder-monitor by maintenance personnel. During the evaluation the medium voltage power supply overloaded. Replacement of V1704, V1705, and V1706 corrected the problem. The frequency of transponder two was also found to be out-of-tolerance. Replacement of the oscillator-doubler and second doubler, and alignment of these circuits brought the frequency within tolerance. However, a crystal was also placed on order for this transponder. Adjustment of the bias potentiometer (R1211) was necessary in order to put the klystron bias supply for number two within tolerance. Because the bias potentiometer was erratic during adjustment a replacement was ordered.

c. Monitors: The A-7 monitor was inoperative on arrival of the TRACALS team. Parts were on order.

d. Supporting Test Equipment: The OS-203 scope did not function properly on channel two during a receiver sensitivity check. A one MW reference point could not be established. An external scope was used during the evaluation to complete the receiver checks. Maintenance scheduled the scope for PMEL after the evaluation.

5-4. Environmental Factors

a. Siting Characteristics: The Wright-Patterson VORTAC facility is located on base and adjacent to the active runway 05/23. Refer to runway data TAB A-3-1 for further information. The terrain surrounding the facility is basically flat in all directions and consists of grassy soil. The nearest large objects are approximately 4000 feet from the VORTAC and their locations are presented in TABs B-1-1 through B-1-4 (Skyline Graph Data).

b. Weather: Rawinsonde data was collected by Air Force Global Weather Central to determine the refractive profile of the atmosphere during the flight phase of the evaluation. This data showed that normal propagation conditions existed at all applicable levels in the Wright-Patterson area during the flight phase, and thus no modification of the flight data occurred due to weather. Since no anomolous propogation was observed, the weather data is not included in the TABs.

c. Electromagnetic Environment: The Wright-Patterson VORTAC is a radio class (T) facility, assured interference free operation within a 25 NM/12000 feet MSL protected service volume. No evidence of frequency interference was noted during the flight evaluation.

5-5. Evaluation Profile: Included in the flight evaluation were alignment and VOR coverage orbits, various radial runs to measure signal levels and to investigate VOR course structure, and a complete check of all published approaches using the VORTAC, including high and low altitude holding patterns and missed approach procedures.

a. Alignment Accuracy: Four theodolite tracked alignment orbits were flown to compare VOR error characteristics before and after tuning of the antenna and improvement of the station ground. Radials were flown to check distance and azimuth accuracy at the reference checkpoint.

b. Course Structure: Data for assessing the quality of TACAN course structure was collected concurrently with coverage data and with checks of the approach procedures. Special profiles were flown to determine the cause of VOR course scalloping between 340° and 010°, including two 20 NM orbits and numerous radials through the restricted area.

c. Coverage: Profiles for measuring the actual signal levels in the coverage volume were designed to maximize the amount of useful data obtained in the available flying time. Starting at the station, radials were flown outbound to 2 minutes beyond the ARN-91 azimuth unlock and the VOR 5 uv point, then inbound 1000 feet lower until 4 minutes after DME lock, then outbound 1000 feet lower and so forth. After the desired altitudes had been flown on a given radial the final track was flown inbound to the VORTAC at the lowest altitude. This method allowed the aircraft to cut back and forth across the coverage fringe radially, gathering data to compile a vertical profile of the signal levels and unlock points on a given radial. Three radials were chosen such that the coverage over representative screening types could be checked while keeping the radials widely dispersed.

d. Interference Field Pattern: Special runs were made on the 047° and 239° approach radials to determine whether nulling was present on either radial. Interference field data was also obtained on the radial runs flown as coverage checks.

e. Approaches and Missed Approaches: Published approaches, missed approaches, and the associated holding patterns were flown as per AFM 55-8 requirements for a normal VORTAC periodic flight inspection.

5-6. Analysis of Evaluation Results: Data was gathered during the flight evaluation to determine the VORTAC's alignment accuracy, to study the course structure, to measure the actual signal levels in the coverage volume, to investigate the interference field profile, and to fulfill the requirements of a normal periodic flight inspection. TABs F-1-1/6 are the official flight inspection report.

a. Alignment Accuracy: Alignment orbits flown with theodolite tracking resulted in a maximum error spread from -0.4° to +1.0° on transponder one and -1.3° to +1.6° on transponder number two. Average alignment error values were +0.25° and +2.5°, respectively. These alignment errors satisfy the AFM 55-8 requirement that all radials must be within 2.5° of the correct magnetic azimuth. Alignment at the reference checkpoint (098.5°/15.5 DME) was +0.5° on both transponders. Orbital data is analyzed in detail in TAB F-2 and plots of the data dispersion appear in the flight inspection report in TABs F-1-5/6.

b. Course Structure: TACAN course structure in the region of normally usable signal levels was exceptionally smooth. Several cases were observed where absolutely no crosspointer action was recorded for several miles radially, indicating roughness values of less than 0.05°. Except for these unusually smooth areas and the roughness at the coverage fringes and in the cone of ambiguity, nominal roughness was approximately 0.2°.

c. Coverage

(1) Evaluation Methodology: Evaluation of TACAN coverage is performed in three distinct phases. First, known analytical and empirical techniques are applied in order to predict expected signal levels at various azimuths and altitudes. Next actual airborne signal strength data is collected and compared with the theoretical predictions. Finally the theoretical model is extrapolated to generate plots of predicted coverage for all azimuths at altitudes of interest. These coverage charts predict signal strength levels rather than unlock points and thus provide useful information for all types of airborne TACAN equipment.

(2) Theory for Predicting Coverage: Procedures for predicting TACAN coverage have been developed over an extended period of time, and represent an integration of classical theory with experience gained in TACAN evaluation. The general procedure involves measurement of elevation angles to the horizon, computation of the line of sight limit based on a 4/3 earth, and application of a standard decay rate of -2.5 dB/NM in the diffraction region. This technique will yield a prediction chart showing the expected range of a given signal level when standard propagation conditions prevail. In this case a level of -85 dBm was termed the coverage limit because this is a representative unlock level among TACAN receivers in the inventory. Airborne verification of the coverage charts is done by flying radial runs, recording received signal levels, correcting the results for anomolous propagation, and comparing these measured -85 dBm points with those predicted by the theory. Good agreement validates the coverage prediction charts. A detailed discussion of the theory used in making these predictions, including all applicable equations, appears in "TACAN Station Evaluation Report", Richards-Gebaur AFB, number 76/66T-86, evaluation period 13-23 December 1976.

(3) Wright-Patterson Measured Coverage

(a) Collecting Signal Strength Data: Actual received signal strength data was derived from the AGC trace on the flight inspection recording by applying the NAFIS calibration curve to obtain dBm values.

The accuracy of this data is limited by the extreme compression caused by the AGC characteristic at high signal levels, and by the inability to correct for the effect of the aircraft's TACAN antenna pattern. In spite of these limitations the recorded AGC trace provides useful information on actual received signal levels in the coverage volume.

(b) Flight Results: TABs F-3-1/3 are plots of the actual received signal levels at various altitudes on each of the three radials flown. TAB F-4 presents the results of the calculations performed to predict the distances to the -85 dBm points, and compares the percentage differences between the predicted and actual points. The average prediction error was -1% using the prediction method described in the Richards-Gebaur report cited earlier. Using a simplified prediction method based on standard 4/3 earth radio line of sight calculations yielded an average prediction error of -13%. The superiority of the new method is obvious, although work is still needed to reduce the prediction error at lower altitudes. It should be noted that a diffraction region decay rate of -2.5 dB/NM was used in these calculations rather than the previously used -4.2 dB/NM. Experience has shown the -2.5 dB/NM value to be more nearly correct in the majority of situations, and this value is more in line with classical propagation theory. TAB F-5 plots the expected TACAN coverage at 30,000 feet MSL assuming a -85 dBm receiver unlock level. Aircraft equipped with more sensitive equipment such as the ARN-91 will experience greater ranges. The charts are derived by correcting the line of sight limits for all azimuths using the technique described above for a single radial. Coverage charts for other altitudes may be extrapolated from the TAB F-5 chart.

d. Interference Field Pattern

(1) General: Interference field theory is well developed and has been discussed in detail in many earlier TACAN evaluation reports, including the Richards-Gebaur report cited earlier. Analytical procedures have been developed which predict the depth and position of nulls for a particular TACAN site. These theoretical procedures are based on the TACAN antenna height, antenna pattern, radiated power, and the character of the surrounding ground, and have been computerized to speed the calculations.

(2) Observed Nulling Structure: The computer model of the expected nulling structure is generated prior to the evaluation field phase, and this information is used to develop flight profiles to check for the presence of the predicted nulling. Special attention is focused on the approach radials between the FAF altitude and the MDA. TABs F-6-1/2 compare the predicted and measured profiles on the 047° radial at 2000 and 2500 feet MSL. It is clear from these plots that there is close agreement with the computer prediction and that classical nulling is occurring on this radial. No significant deterioration of

TACAN service is resulting from the nulls, however, because any side reflections which may be present are not strong enough to cause large crosspointer deviations. Only slight increases in course roughness occurred in the nulls as depicted on the TABs. Nulling on the 232° approach radial was insignificant. Nulling was observed at higher altitudes on all three radials flown to check coverage, but increases in course roughness were all small and consequently a detailed analysis is not needed.

e. Approaches and Missed Approaches: All high and low TACAN approaches to both runways were flown using both transponders, including holding patterns, DME arcs, and the complete missed approach procedures. A small area of 1.8° roughness was detected at 5.4 NM/2000 feet MSL on the HI-VORTAC/ILS runway 23 approach, caused by the 3rd null. On a repeat of this approach approximately 1.5° of roughness appeared at 8.6 NM/2200 feet MSL in connection with the 2nd null. Aside from these minor course aberrations no other areas of deteriorated structure were found anywhere on any of the holding patterns, transition arcs and radials, final approaches, or missed approaches.

6. VOR

6-1. Equipment Details

a. General

(1) The AN/FRN-31A TVOR facility consists of four basic equipment groups: the transmitter group, the regulator group, the local control group, and the antenna group. The regulator group is not used if commercial power is sufficiently stable. A remote control group is also provided which allows remote monitoring and control of the equipment and allows voice transmissions to aircraft.

(2) The omnirange system is used primarily as a radio aid to aircraft navigation, providing bearing information to properly equipped aircraft from a fixed point on the ground. Voice and identification codes are also transmitted. The equipment operates within the frequency range of 108 to 118 MHz with a nominal power output of 50 watts.

(3) Radials projected from the antenna provide tracks to or from the station. These tracks are straight lines and are identified in degrees with 0 degrees coinciding with magnetic north. Radial information projected by the station is independent of aircraft heading and provides a straight line track across the surface of the earth. A 1020 Hertz keyed tone signal is transmitted periodically for identification.

(4) Energy radiated from the TVOR has two separate components, the reference and variable signals, both of which are 30 Hertz signals. The aircraft receiver measures the omnirange course by calculating the phase difference between the two signals. The reference signal is the result of frequency modulating a 9960 Hertz subcarrier at a 30 Hertz rate. The variable signal is produced by a rotating limacon pattern whose peak is adjusted to agree in time with the maximum frequency of the FM reference signal in the direction of magnetic north from the station. At all other points, the phase difference between the reference and variable signals equals the azimuth of the receiving point.

b. Special: The Wright-Patterson TVOR operates on a frequency of 115.2 MHz with an identification code of FFO.

6-2. Facility Equipment

VOR Transmitter One: AN/FRN-31A, Serial Number 108
VOR Transmitter Two: AN/FRN-31A, Serial Number 111
Monitor: 477A, Serial Number 498

6-3. Equipment Status: All equipment checks were performed in accordance with AFCSP 100-61, Volume XX. Detailed results of these checks are found in TABs E-5-1/2. Oscilloscope photographs are depicted in TAB D-2. TABs E-6-1/4 contain results of pre and post airborne evaluation equipment checks. Environmental conditions inside the shelter are plotted on TAB E-3.

a. The following items were found out-of-tolerance on the transmitters.

(1) Transmitter One

(a) The final amp screen and final amp total meter readings were low. Corrected.

(b) A low meter reading for the 10 KC alarm position was noted on the monitor. Corrected.

(2) Transmitter Two

(a) The final amp total meter reading was initially low. At the time of the last post flight check this parameter was within tolerance.

(b) The final amp screen meter reading became out-of-tolerance during the evaluation. This discrepancy had no adverse effect on the evaluation of the facility.

(c) The monitor 10 KC level meter reading was low. Corrected.

(d) The reference modulation was high. Corrected

(e) The identity modulation was low. Corrected.

b. Goniometers

(1) Subcarrier generator frequency checks were performed on both goniometers. The data were analyzed and found to be satisfactory. See TABs E-7-1/2.

(2) Past evaluations have revealed out-of-tolerance RF power conditions in all goniometers checked. Because of this, doubt has been raised concerning the validity of the test methods given in the tech orders. At the request of AFCS/FFOT, special checks were made on the goniometers at Wright-Patterson AFB. The data collected will be forwarded to FFOT for study.

c. The 477A TVOR monitor operated satisfactorily insuring that the facility was operating in a safe and reliable condition.

d. Both the red and green sideband VSWR's were out-of-tolerance (see TAB E-5-1). When the antenna was last tuned, it was tuned deliberately out of technical order specifications so that it would perform better during the temperature variations that occur from season to season. HQ AFCS recently investigated the tuning of VOR antennas to determine if the philosophy of tuning antennas by the method prescribed in the Air Force Technical Orders or by the temperature variation method is best. The TO procedure was determined to be superior, thus the 2046 Comm Group should retune the antenna for best VSWR.

e. The initial ground checks revealed a total error spread of 4.21° in transmitter one, 3.94° in transmitter two, and a transmitter differential of 1.04° as shown in TABs E-8-1 through E-10-6. The total error spread in transmitter one was out-of-tolerance. The maximum ground error spread allowed is 4.0°. The antenna was tuned by local personnel and the interim ground checks revealed a satisfactory error spread. See TABs E-11-1/2.

f. Detailed analysis of the system errors as derived from the final ground checks is as follows.

(1) Transmitter One: The data on the Error Computation Worksheet, TAB E-12, was derived from the forward and reverse ground checks, TABs E-13-1/2. The Total Error Curve TAB E-14 and the polar graphs, TABs E-15-1/3 were drawn from data on the Error Computation Worksheet. Analyzing these TABs reveals a total error spread of 2.96°, an antenna error spread of 2.85°, and a goniometer error spread of 0.97°.

(2) Transmitter Two: The data on the Error Computation Worksheet, TAB E-12 was derived from the forward and reverse ground checks, TABs E-16-1/2. The Total Error Curve TAB E-17 and the polar graphs, TABs E-18-1/3 were drawn from data on the Error Computation Worksheet. Analyzing these TABs reveals a total error spread of 2.25° and a goniometer error spread of 0.51°. Transmitter differential was 0.94 as shown on TAB E-19.

g. Supporting Test Equipment Status: All necessary test equipment was available and properly calibrated.

6-4. Electromagnetic Environment: See paragraph 5-4.

6-5. Evaluation Profile: The VOR flight profile was designed to collect data similar to that described in section 5-5 for the TACAN, except that additional 20 NM orbits were flown to obtain plots of scalloping amplitude. Level radial runs were also flown at 10° intervals in the restricted area in an effort to isolate the source of the reflections causing excessive scalloping in this area. Loss of signal coverage radials were flown to the 5 uv point. Except for these additional runs, and for the omission of the interference field runs which apply to TACAN only, the VOR profile was identical to the profile discussed in section 5-5.

6-6. Analysis of Evaluation Results: Flight data was gathered to determine the VOR's alignment accuracy and error spread, to study the scalloping structure, to measure the actual received signal levels in the coverage volume, and to fulfull all the requirements of a normal periodic flight inspection.

a. Alignment Accuracy: Initial VOR alignment orbits revealed error spreads of 4.4° and 3.3° on transmitters one and two respectively. Ground check spreads were 4.2° and 3.9°. Since transmitter one exceeded the allowable 4.0°, local maintenance removed this transmitter from service pending corrective action. Following installation of an improved station ground and retuning of the VOR antenna, the airborne error spreads were 2.8° and 2.6°, and both ground checks fell within tolerance. Final average alignment errors were 0.93° on transmitter one and 0.86° on transmitter two, and alignment at the reference checkpoint was +0.9° on both transmitters. All final radial alignments satisfied AFM 55-8 requirements.

b. Course Structure: Particular attention was devoted in the flight phase to the area of poor structure to the north which is restricted "unreliable 340°-010° below 3000 feet MSL". Orbits were flown at 20 NM to obtain plots of scalloping amplitude, and radials were selected at 10° intervals within the restriction to validate the need for the restriction. All this data was collected in an effort to isolate the cause of the scalloping.

(1) Orbital Structure Analysis: TAB F-10 is a plot of the VOR scalloping amplitude versus magnetic azimuth on a 25 NM orbit at 2500 feet MSL. The scalloping which requires the restriction is not apparent on this plot in that the scalloping amplitude on the entire orbit is less than 2 degrees and no marked increase occurs at 340°-010°. Since the scalloping amplitude is uniform with a low nominal value, no single source of a strong reflection can be identified using the orbital method. Analysis was also performed using a reflector overlay method (ref. Kadena NAVAIDS Evaluation Report 76/66N-62). This is a graphical

method which involves measuring the scalloping frequency at various points on an orbit and marking the location of potential reflectors on a scaled chart under parabolas which correspond to the scalloping frequency. The result of such an analysis is a series of lines on the chart which should coverage at the source of the scallops. The result of this analysis for Wright-Patterson was the trivial case, where all the lines converged at the VOR, indicating that no reflector is present which causes orbital scalloping.

(2) Radial Structure Analysis: Orbital flights through the restricted area at 2500 feet revealed very little scalloping, but radial flights at the orbit altitude showed large amplitude periodic scalloping of as much as 8°. Hangar 206 is the only obvious reflector oriented to cause interference in the region to the north, and although it is 5850 feet from the VORTAC, its immense size is sufficient to make it an efficient reflector. Figure 6-1 shows the geometry of this reflection.

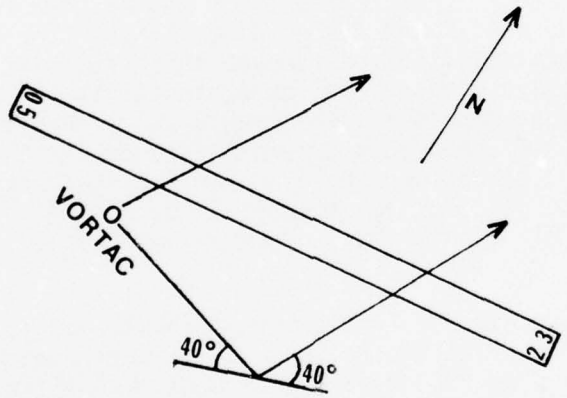


Figure 6-1
Reflections from Hangar 206

It is clear from this figure that reflections from the hangar face are directed into the 340°-010° restricted area. Well developed analytical procedures exist to predict the scalloping frequency. These procedures take account of the distance to the reflector and the angle of incidence

upon the reflecting surface, and were discussed in detail in the Kadena report previously cited. Assuming that the hangar is the primary reflector, the analytical procedures predict a scalloping frequency at 25 NM of .020 Hz. This corresponds almost exactly with the measured scalloping frequency on the 355° radial at 25 NM. As the aircraft moved closer to the VORTAC the scalloping frequency increased and the amplitude decreased, indicating that the reflection is below an angle of approximately 1.4°. Although both intuition and a modest analytical test strongly suggest that the restriction is caused by reflections from this hangar, it can not be proven with complete confidence because of the peculiar lack of orbital or tangential scalloping to confirm the analysis.

(3) Restricted Airspace: In spite of the inability to prove positively that hangar 206 is the source of the offending reflections, extensive radial probes in and beyond the restricted area confirm the validity of the restriction as it was originally specified by FAA in the commissioning flight inspection report.

c. Coverage

(1) Methodology: VOR signal strength data was recorded concurrently with the TACAN data using the same flight profile. The analysis method was identical to that discussed in section 5-6c for TACAN, except that the received signal levels derived from the VOR receiver calibration curve are typically expressed in microvolts. To enable more direct comparison with TACAN signal levels, the VOR microvolt values were converted to dBm, assuming a 50 ohm purely resistive VOR receiver input port.

(2) Flight Results: TABs F-8-1/3 present the VOR measured signal levels on the three radials flown. It is clear from comparing these plots with the TACAN graphs that the VOR signals decay somewhat more linearly with distance. The free space decay curves are superimposed as dashed lines on these plots. As with the TACAN plots, the signal decay follows the free space curves within the optical region, decaying somewhat more rapidly within the diffraction region, except that the breakpoint between the regions is much less distinct than with TACAN. A decay rate of -2.5 dB/NM was applied in the same algorithm used to predict TACAN coverage, and -85 dBm (12.6 uv) was defined as the minimum usable signal level to facilitate direct comparison with the TACAN coverage. Results of the calculations applying the TACAN algorithm to VOR appear in TAB F-9. It is clear from the results in this TAB that the TACAN prediction technique is not particularly accurate when applied to VOR, and that the method offers no immediately apparent advantage over conventional line of sight coverage prediction techniques. TAB F-5 compares predicted VOR coverage at 30,000 feet MSL with predicted TACAN coverage at the same altitude, with the VOR prediction based solely on line of sight screening. As with the TACAN plots, coverage of the VOR for other altitudes may be extrapolated from the TAB F-5 data. Work is in progress to develop more accurate coverage prediction techniques for VOR.

d. Approaches and Missed Approaches: With minor exceptions VOR course structure on all approaches, holding patterns, and missed approaches was excellent, and nominal values of scalloping were approximately 0.5°. Some course deterioration was noted to the northeast, however, with 1.6° of scalloping on the 047° radial at 10 NM/2600 feet. On the 050° missed approach radial scalloping of 2.4° was measured at 10 NM/2900 feet, and 3.0° at 13 NM/3000 feet. Neither of these latter aberrations has any mission impact because the missed approach extends only to 10 NM. The scalloping on the 047° radial is outside the final approach fix and is not of sufficient amplitude to cause difficulty in tracking.

7. POWER FACILITIES

7-1. Equipment Details: Primary power for the VORTAC is supplied by a commercial source. Secondary power consists of a Gen Fermont 60 KW generator.

7-2. Equipment Status: Commercial power was satisfactory. Backup power was stable and of sufficient capacity to satisfactorily operate the VORTAC. Results of AC power checks appear in TAB E-2.

7-3. Adequacy/Reliability: Primary power for the VORTAC was adequate and reliable. Secondary power was also satisfactory.

TITLE

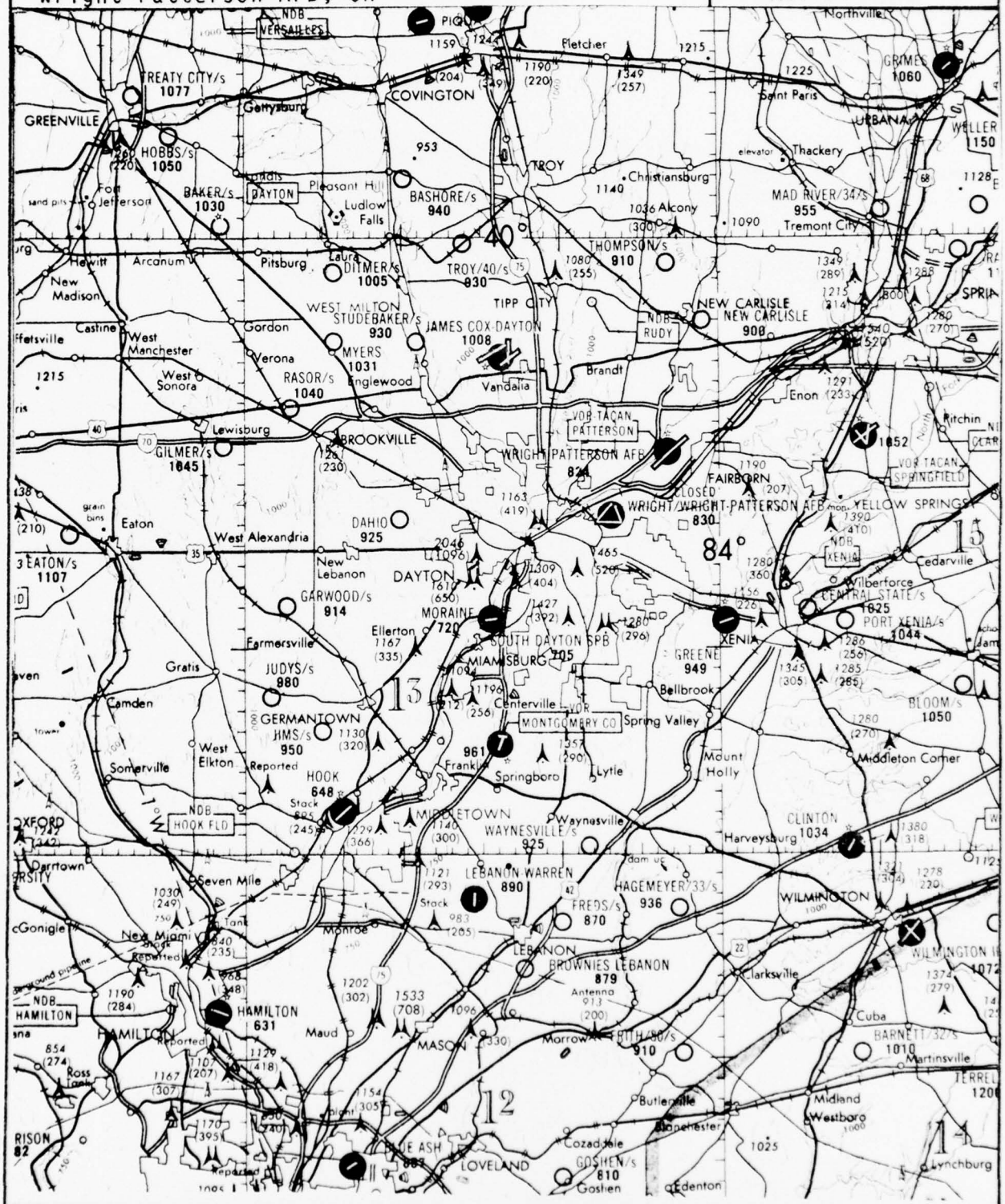
LOCATION MAP

LOCATION

Wright-Patterson AFB, OH

DATE

Mar 77



REMARKS

Scale 1;500,000 (Tactical Pilotage Chart)

TITLE

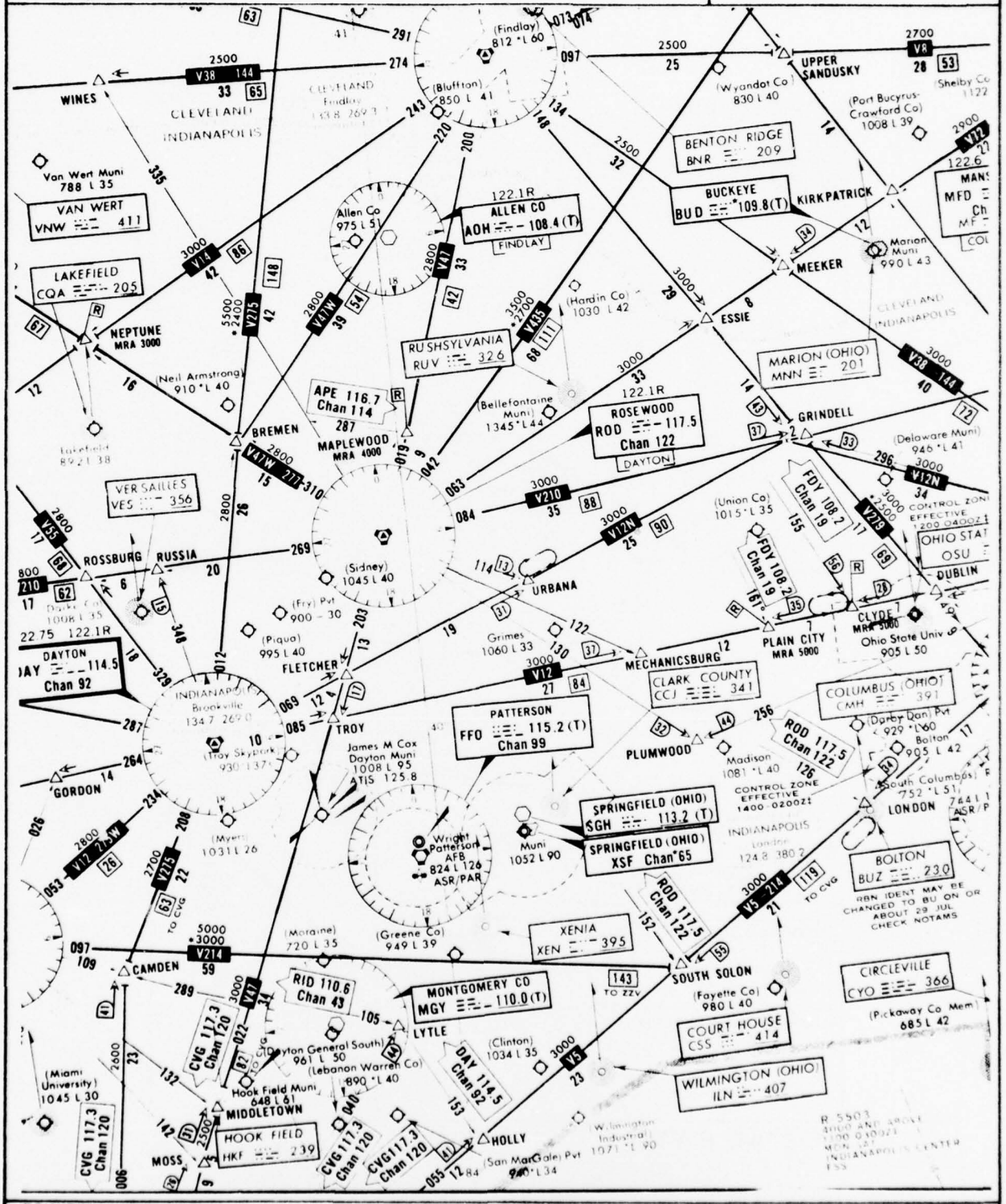
Enroute Low Altitude Chart

LOCATION

Wright-Patterson AFB, OH

DATE

Mar 77



REMARKS

Chart L-23

Scale: 1" = 12 NM

TITLE

INSTRUMENT APPROACH PROCEDURE

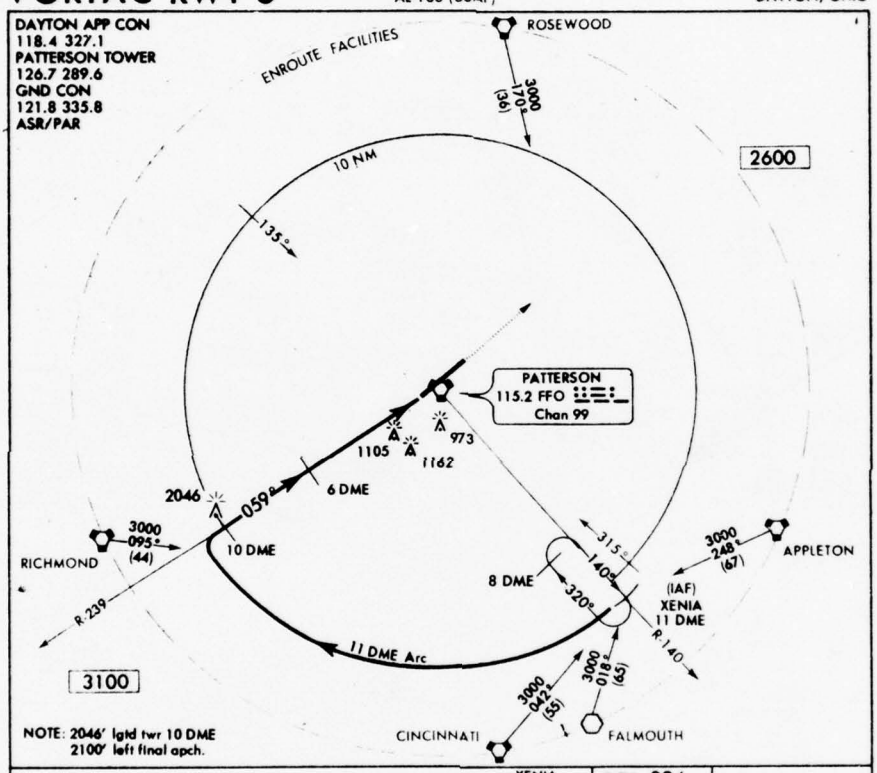
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77

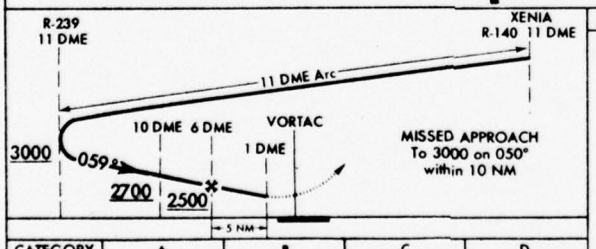
331

VORTAC RWY 5

AL-108 (USAF)

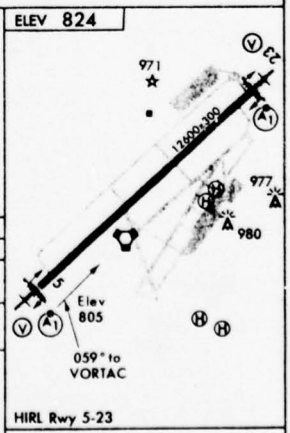
WRIGHT-PATTERSON AFB
DAYTON, OHIO





CATEGORY	A	B	C	D
S-5	1360/24 555 (600-½)		1360/40 555 (600-¾)	
CIRCLING *	1360-1 536 (600-1)		1360-1½ 536 (600-1½)	1380-2 556 (600-2)

* Circling not authorized SE Rwy 5-23



VORTAC RWY 5

39°50'N - 84°03'W

331

DAYTON, OHIO
WRIGHT-PATTERSON AFB

REMARKS

TITLE

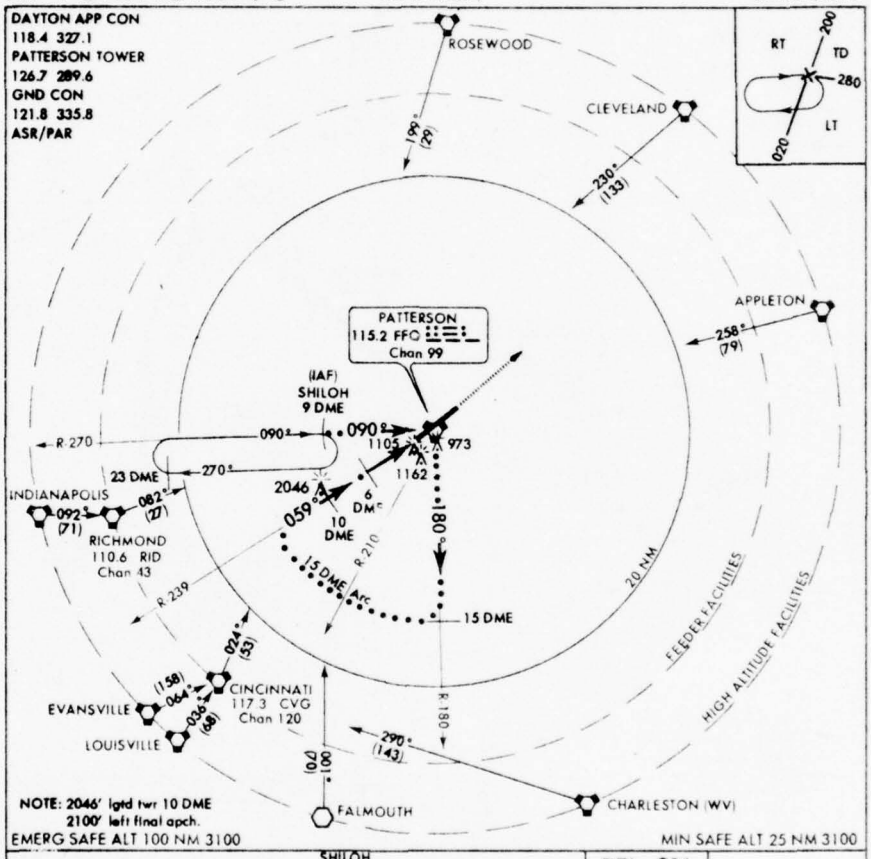
INSTRUMENT APPROACH PROCEDURE

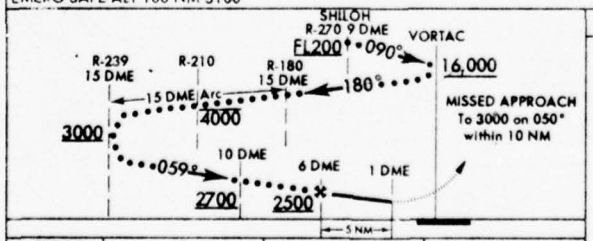
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77

146

HI-VORTAC RWY 5

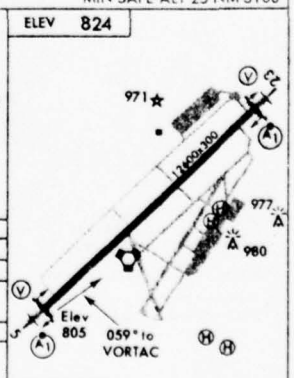
WRIGHT-PATTERSON AFB
DAYTON, OHIO





CATEGORY	C	D	E
S-5	1360/40 555 (600-¾)		
CIRCLING*	1360-1½ 536 (600-1½)	1380-2 556 (600-2)	1460-2 636 (700-2)
S-PAR 5	905/16 100 (100-¼)		

* Circling not authorized SE of Rwy 5-23



HI-VORTAC RWY 5

39°50'N - 84°03'W

DAYTON, OHIO
WRIGHT-PATTERSON AFB

146

REMARKS

TITLE
INSTRUMENT APPROACH PROCEDURE

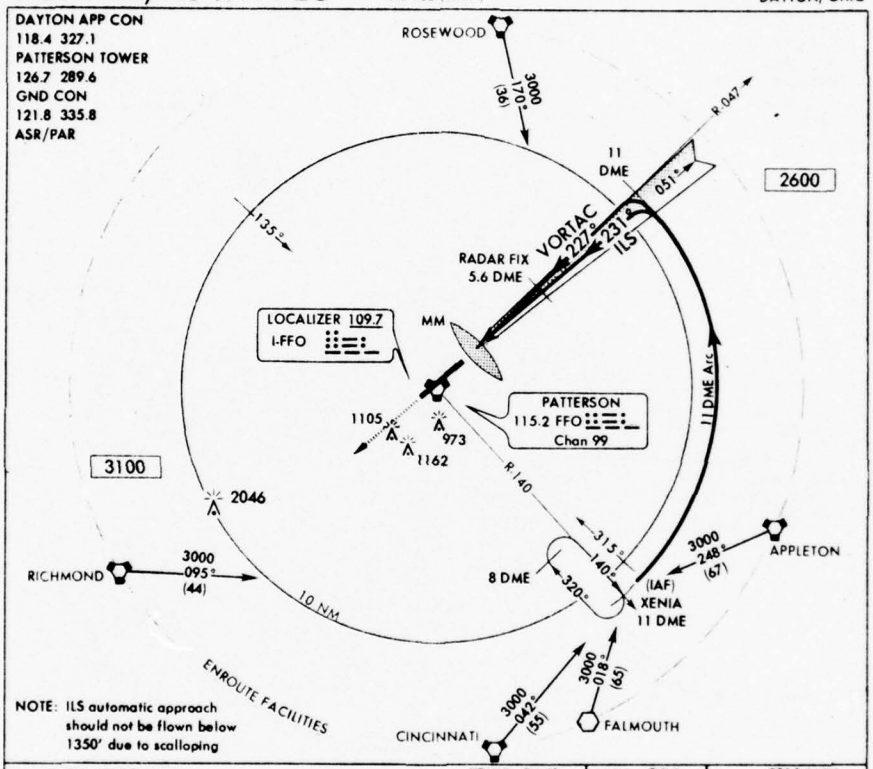
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77

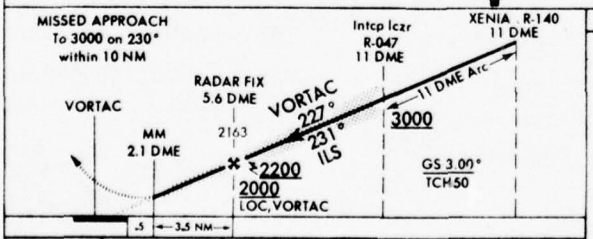
332

VORTAC/ILS RWY 23

AL-108 (USAF)

WRIGHT-PATTERSON AFB
DAYTON, OHIO





CATEGORY	A	B	C	D
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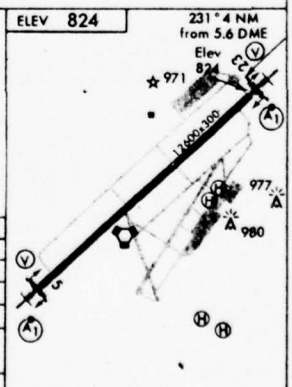
S-LOC 23	1220/24 396 (400-½)		1220/40 396 (400-¾)	
S-VORTAC 23	1300/24 476 (500-½)		1300/40 476 (500-¾)	
CIRCLING *	1320-1 496 (500-1)		1340-1½ 516 (600-1½)	1380-2 556 (600-2)

*Circling not authorized SE of Rwy 5-23



LOC FAF to MAP 4 NM					
Knots	60	90	120	150	180
Min: Sec	4:00	2:40	2:00	1:36	1:20

VORTAC/ILS RWY 23

39° 50' N - 84° 03' W

DAYTON, OHIO
WRIGHT-PATTERSON AFB

332

REMARKS

TITLE

INSTRUMENT APPROACH PROCEDURE

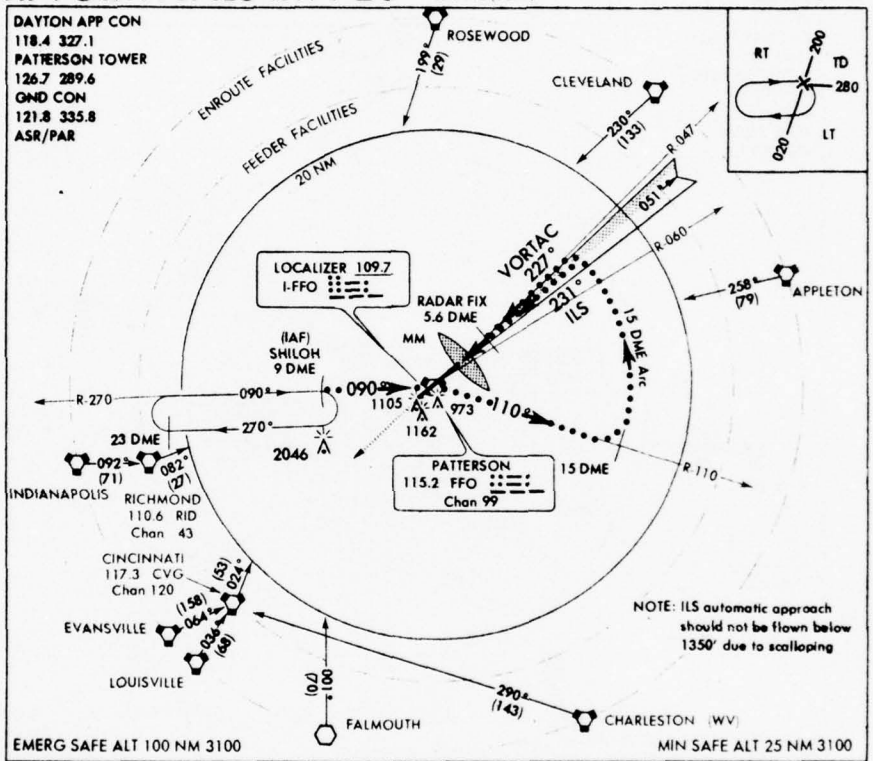
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77

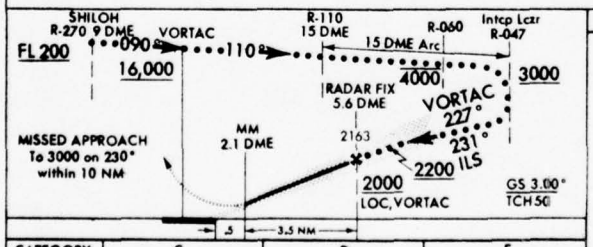
147

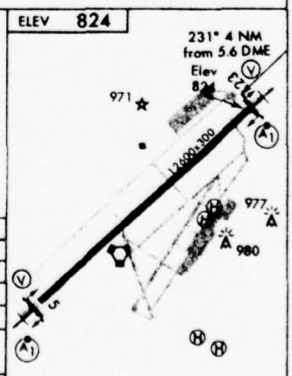
HI-VORTAC/ILS RWY 23

JAL-108 (USAF)

WRIGHT-PATTERSON AFB
DAYTON, OHIO







CATEGORY	C	D	E
S-ILS 23	1024/24 200 (200-½)		
S-LOC 23	1220/40 396 (400-¾)		
S-VORTAC 23	1300/40 476 (500-¾)		
CIRCLING *	1340-1⅛ 516 (600-1⅛)	1380-2 556 (600-2)	1460-2 636 (700-2)
S-PAR 23	924/16 100 (100-¼) GS 3°		

* Circling not authorized SE of Rwy 5-23

LOC FAF to MAP 4 NM					
Knots	120	140	160	180	200
Min: Sec	2:00	1:43	1:30	1:20	1:12

HI-VORTAC/ILS RWY 23

39° 50' N - 84° 03' W

147

DAYTON, OHIO
WRIGHT-PATTERSON AFB

REMARKS

TITLE

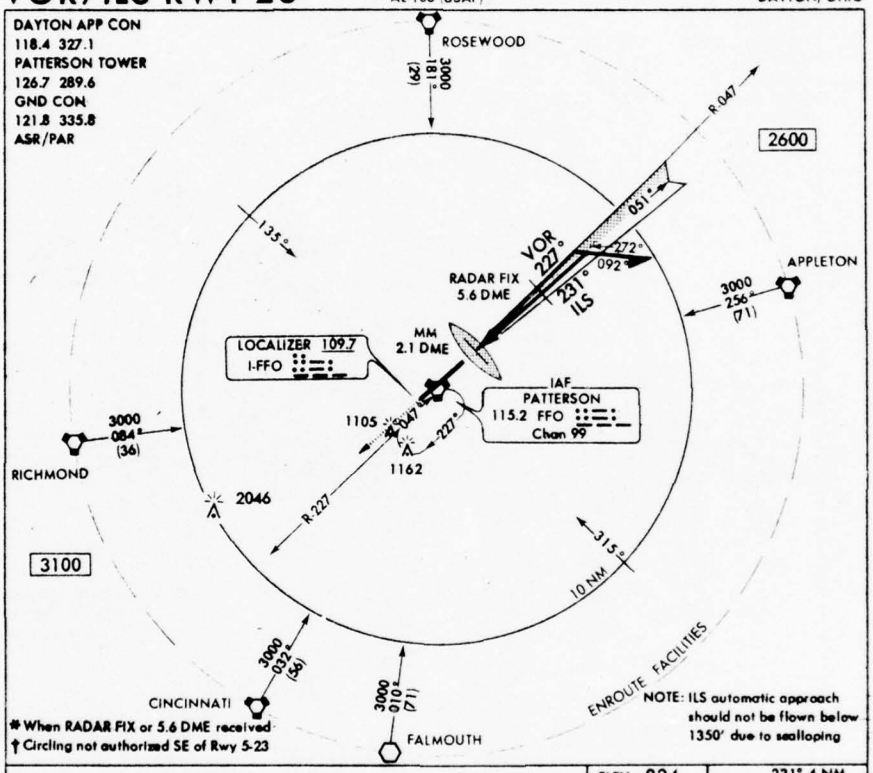
INSTRUMENT APPROACH PROCEDURE

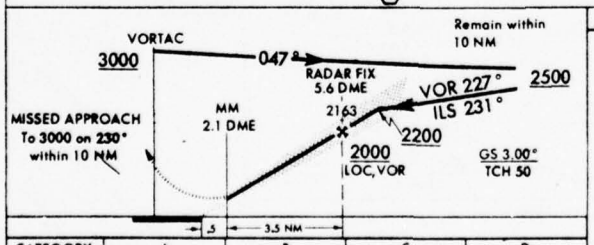
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77

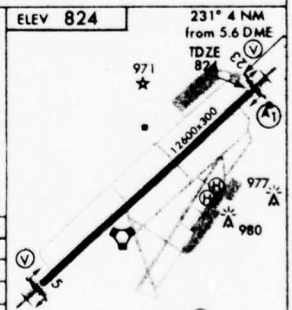
330

VOR/ILS RWY 23

WRIGHT-PATTERSON AFB
DAYTON, OHIO







CATEGORY	A	B	C	D
S-ILS 23	1024/24 200 (200-½)			
S-LOC 23	1220/24 396 (400-½)		1220/40 396 (400-¾)	
S-VOR 23	1600/24 776 (800-½)	1600/40 776 (800-¾)	1600/50 776 (800-1)	1600/60 776 (800-1¼)
CIRCLING†	1600-1 776 (800-1)	1600-1¼ 776 (800-1¼)	1600-1½ 776 (800-1½)	1600-2 776 (800-2)
DME/RADAR MINIMA				
S-VOR 23 *	1300/24 476 (500-½)		1300/40 476 (500-¾)	
CIRCLING*†	1320-1 496 (500-1)		1340-1½ 516 (600-1½)	1380-2 556 (600-2)

LOC FAF to MAP 3.5 NM					
Knots	60	90	120	150	180
Min:Sec	3:30	2:20	1:45	1:24	1:10

VOR/ILS RWY 23

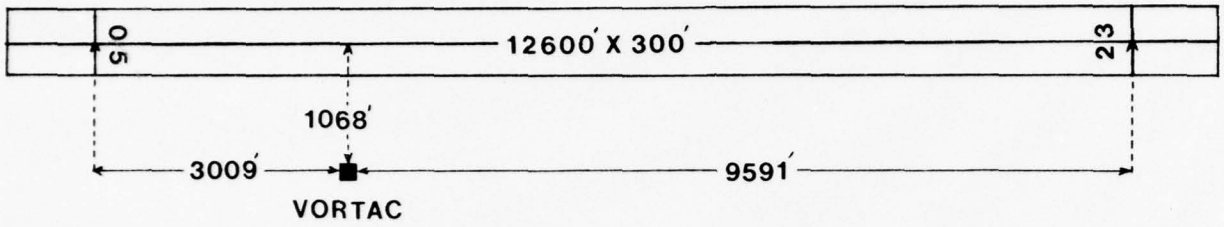
39° 50' N - 84° 03' W

330

DAYTON, OHIO
WRIGHT-PATTERSON AFB

REMARKS

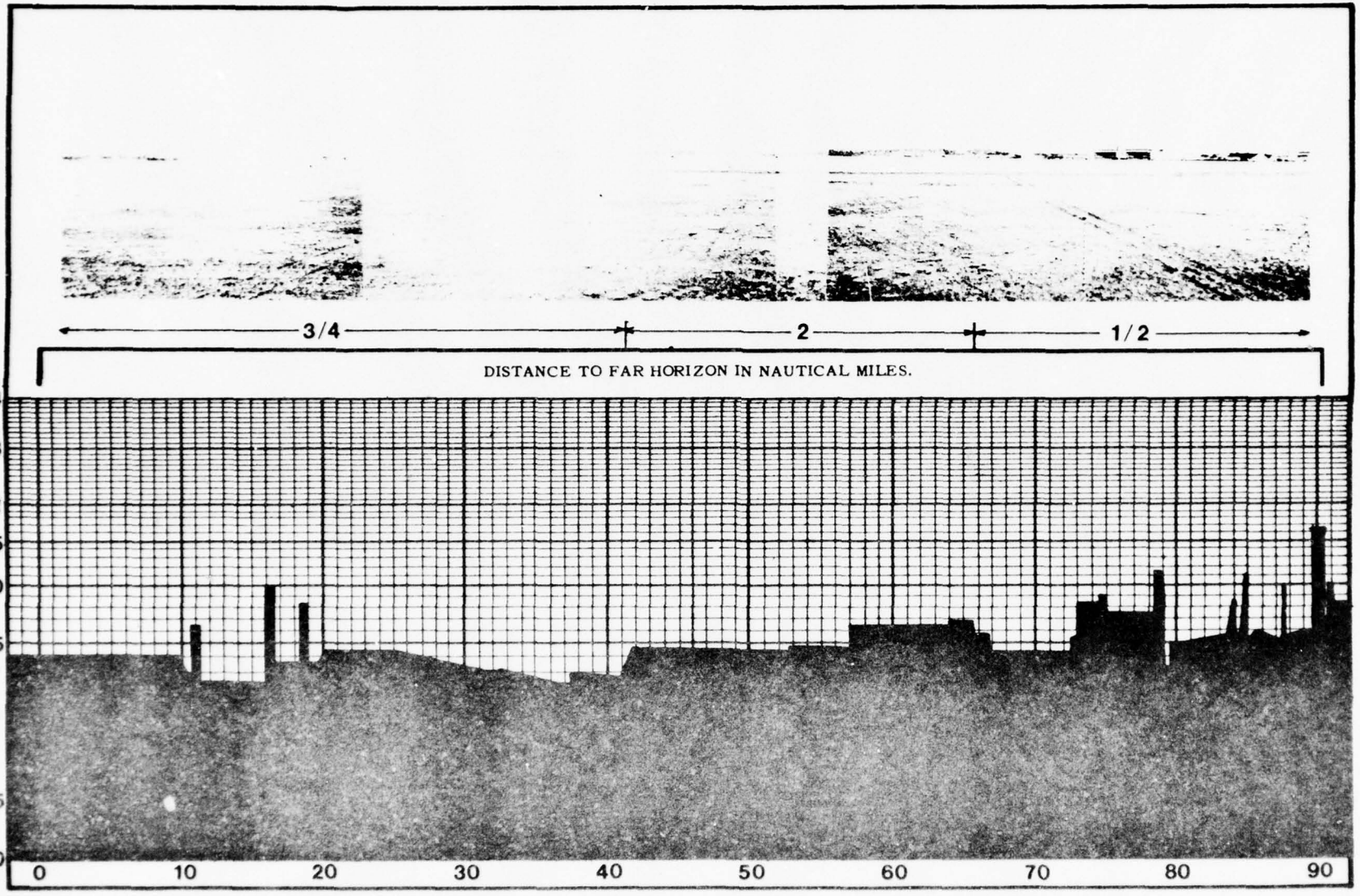
RUNWAY DATA		DATE MAR 77
LOCATION Wright-Patterson AFB,OH.	RUNWAY 05-23	SCALE None



ELEVATIONS

VORTAC:	805.69
END OF RUNWAY 05:	805.00
END OF RUNWAY 23:	823.93
TD POINT RUNWAY 05:	804.90
TD POINT RUNWAY 23:	823.10

SKYLINE GRAPH



ORIENTED TO: MAGNETIC NORTH

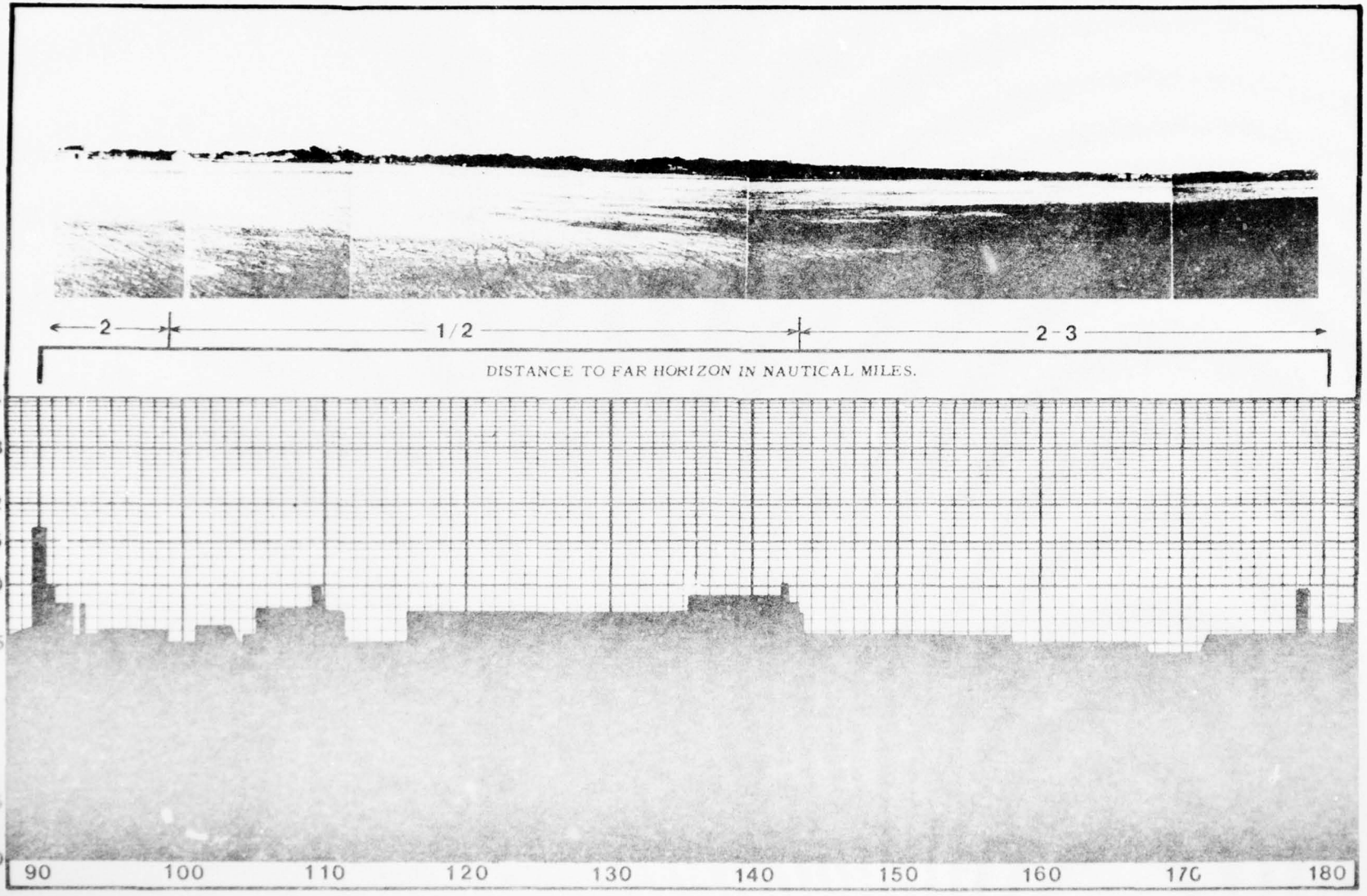
STATION WRIGHT-PATTERSON AFB

EQUIPMENT AN/FRN-32

AFCS FORM MAY 73 913

TAB B-1-1

SKYLINE GRAPH



ORIENTED TO: MAGNETIC NORTH

STATION WRIGHT-PATTERSON AFB

EQUIPMENT AN/FRN-32

AFCS FORM MAY 71 913

TAB B-1-2

SKYLINE GRAPH

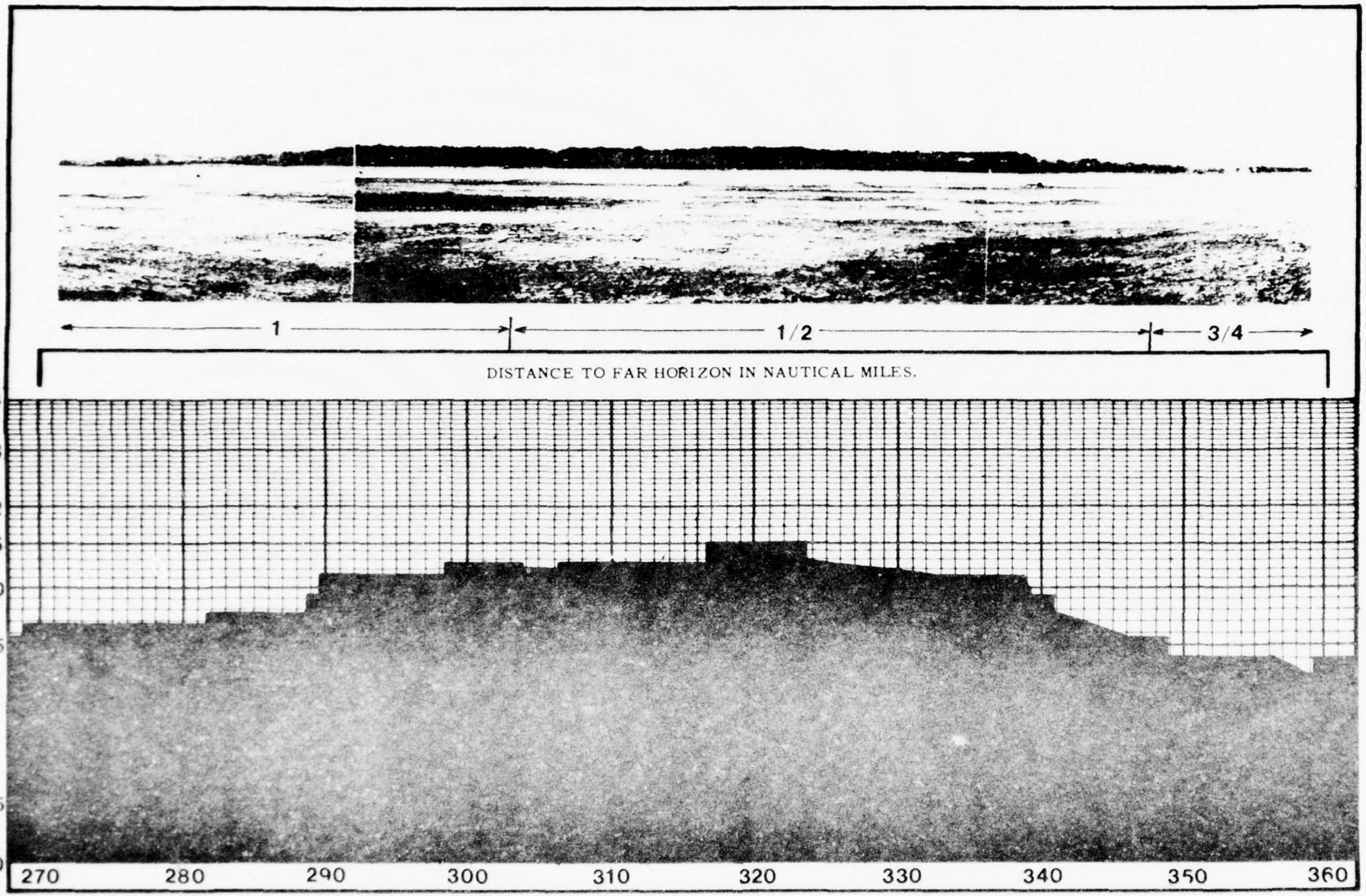
ORIENTED TO: MAGNETIC NORTH

STATION WRIGHT-PATTERSON AFE

EQUIPMENT AN/FRN-32

AFCS FORM MAY 71 913

SKYLINE GRAPH



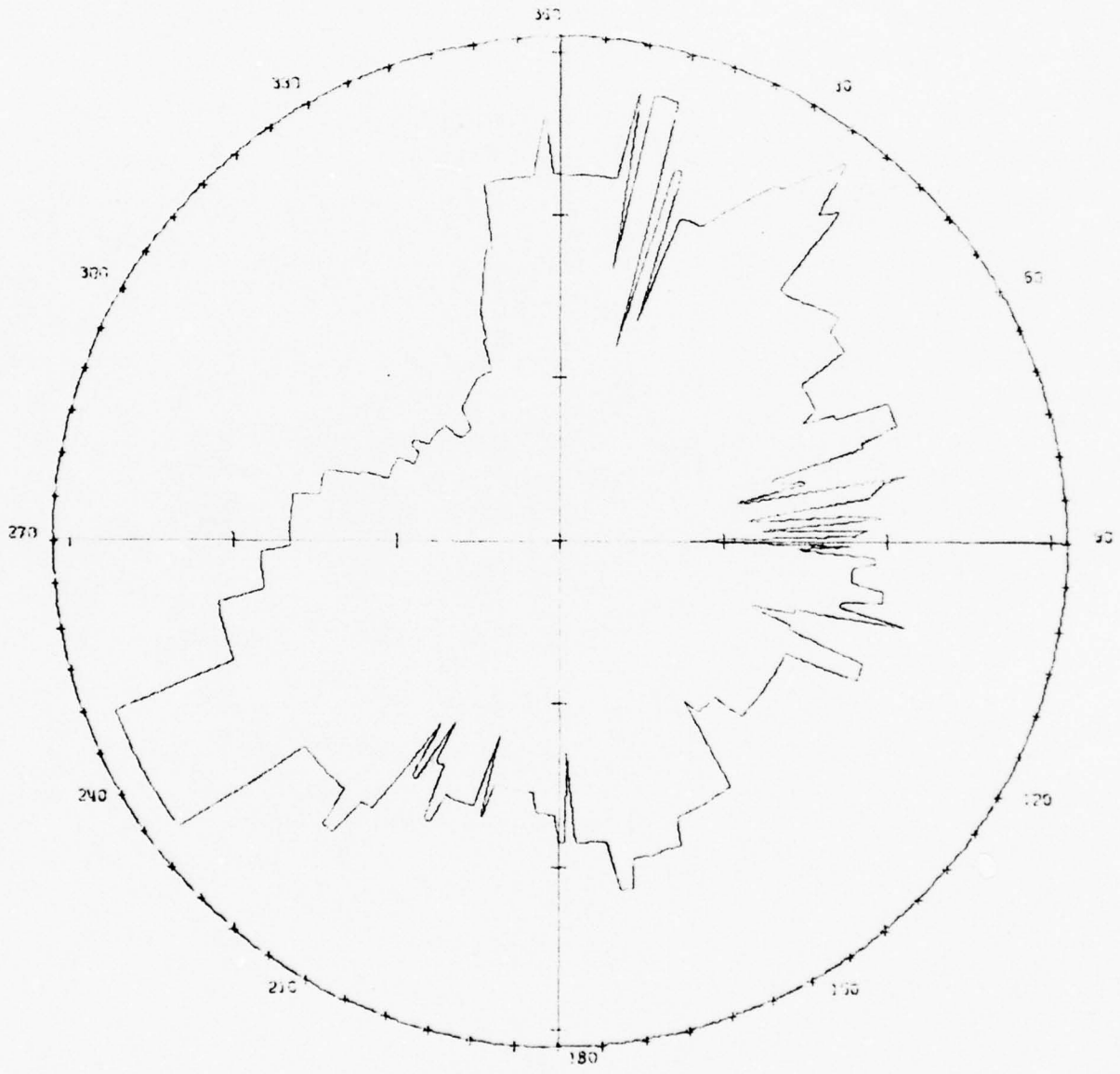
ORIENTED TO: MAGNETIC NORTH

STATION WRIGHT-PATTERSON AFB

EQUIPMENT AN/FRN-32

AFCS FORM MAY 73 913

LINE OF SIGHT COVERAGE (RLS)

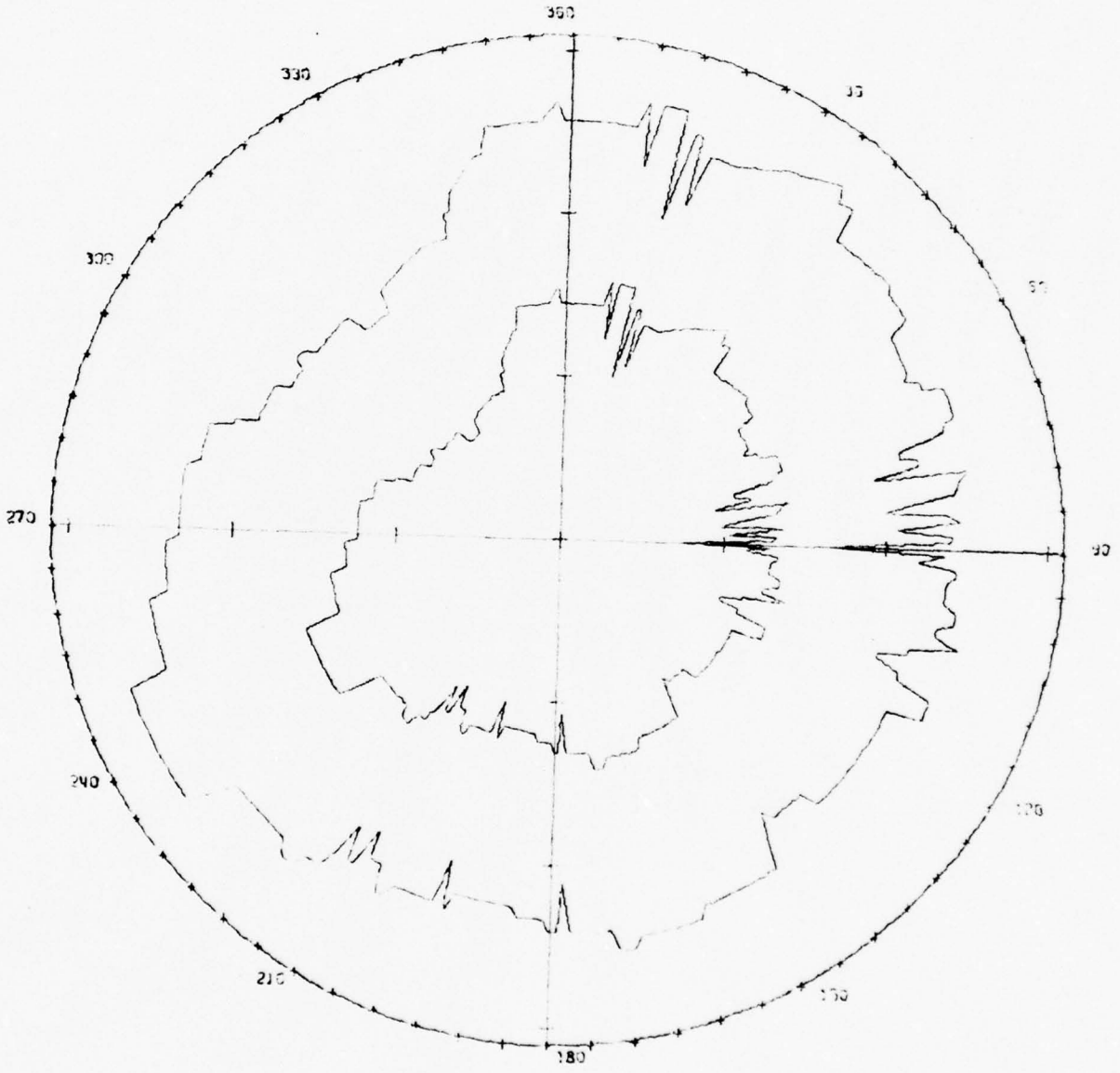


WRIGHT-PATTERSON AFB
VORTAC
17 MAR 77
SITE ELEVATION 806 FT. MSL
SCALE: 1 INCH = 15 NM
ORIENTED TO MAGNETIC NORTH

ALTITUDES FT. MSL
3000

VARIATION 2 DEG W

LINE OF SIGHT COVERAGE (RLS)



WRIGHT-PATTERSON AFB
VORTAC
17 MAR 77
SITE ELEVATION 806 FT. MSL
SCALE: 1 INCH = 70 NM
ORIENTED TO MAGNETIC NORTH

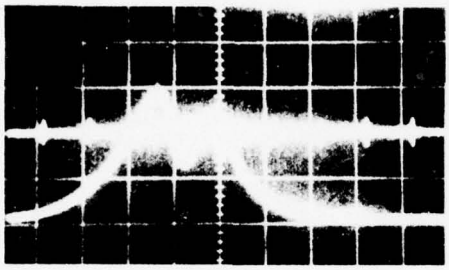
ALTITUDES FT. MSL
12000
30000

VARIATION 2 DEG W

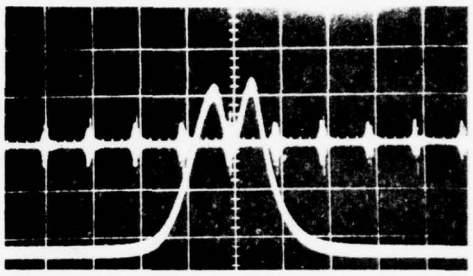
TITLE

TACAN EQUIPMENT PHOTOGRAPHS

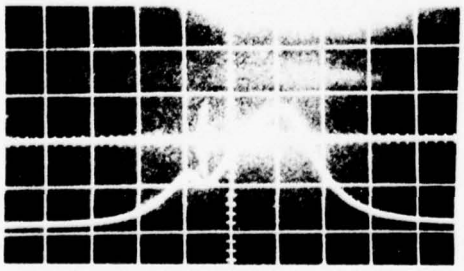
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77



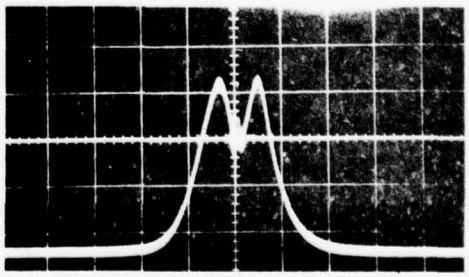
RECEIVER #2 IF AMP-TP-2
1 MHz MARKERS, BEFORE ALIGNMENT



RECEIVER #2 IF AMP-TP-2
1 MHz MARKERS, AFTER ALIGNMENT



RECEIVER #1 IF AMP-TP-2
ON CHANNEL MARKER, BEFORE ALIGNMENT



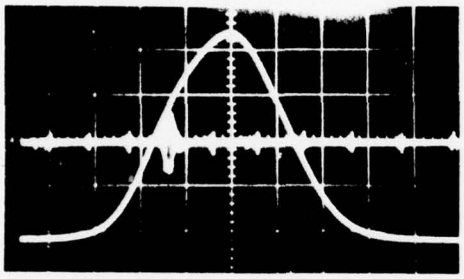
RECEIVER #1 IF AMP-TP-2
ON CHANNEL MARKER, AFTER ALIGNMENT

REMARKS

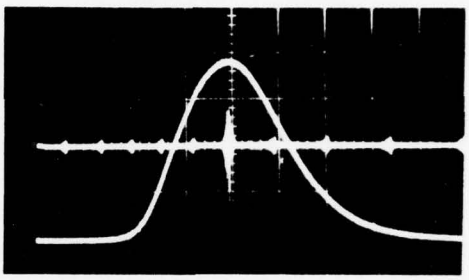
TITLE

TACAN EQUIPMENT PHOTOGRAPHS

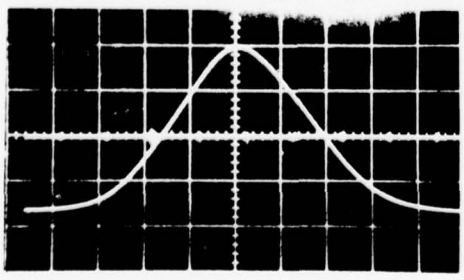
LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77



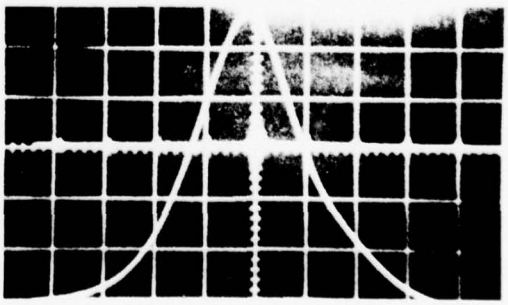
RECEIVER #2 PRE-SEL
ON CHANNEL MARKER AND 1 MHz MARKERS
BEFORE ALIGNMENT



RECEIVER #2 PRE-SEL
ON CHANNEL MARKER AND 1 MHz MARKERS
AFTER ALIGNMENT



RECEIVER #2 PRE-AMP
ON CHANNEL MARKER AND 1 MHz
MARKERS, BEFORE ALIGNMENT



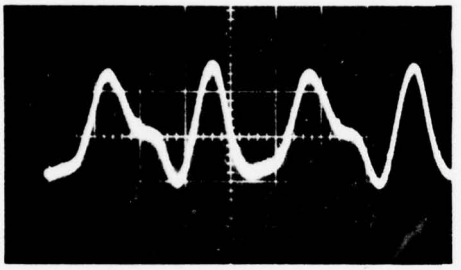
RECEIVER #2 PRE-AMP
ON CHANNEL MARKER AND 1 MHz
MARKERS, AFTER ALIGNMENT

REMARKS

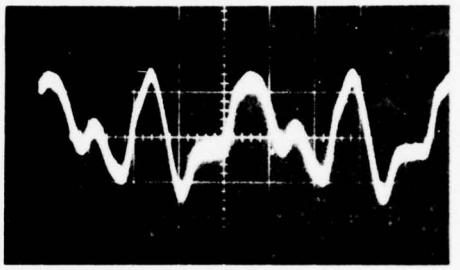
TITLE:

TVOR EQUIPMENT PHOTOGRAPHS

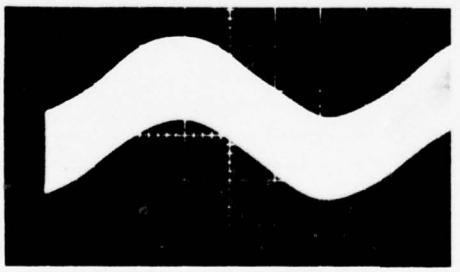
LOCATION	DATE
Wright Patterson AFB, OH	Mar 77



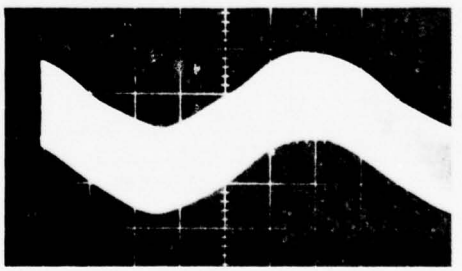
TX 1 R F Phasing



TX 2 R F Phasing



TX 1 Variable Modulation
1V/CM



TX 2 Variable Modulation
1V/CM

REMARKS

TACAN INITIAL PERFORMANCE CHECK LIST

DATE: 16-18 Mar 77

LOCATION	ORGANIZATION	TYPE EQUIPMENT	SERIAL NUMBER
Wright-Patterson	2046 Comm Gp	AN/GRN-20C	18/40

SECTION I — RECEIVER SUBSYSTEM

CHECK		SPECIFICATION	CHECK RESULTS: RECEIVER #1 INITIAL	RECEIVER #1 ADJUSTED	RECEIVER #2 INITIAL	RECEIVER #2 ADJUSTED
PULSE COUNT		2700 ± 90 pps	2788		2753	
SQUITTER CONTROL	A. VOLTS	-5 ± 1	-4.4		-4.2	
	B. COUNT	2200 ± 80 pps	NA		NA	
SENSITIVITY		-94dBm ± 3	-96.2		-95.2	
DECODING	A. +0.5 usec	Less than 3 dBm decrease in sensitivity	-95.2		-93.2	
	B. -0.5 usec	Less than 3 dBm decrease in sensitivity	-95.7		-95.2	
	C. 8 usec	At least 50 dBm decrease in sensitivity	* -52.5		* -43.4	
	D. 15 usec	At least 50 dBm decrease in sensitivity	-46.2		-45.2	
ATTENUATOR SETTING		-83 dBm/600 PPS Nominal	-13.7		-12.7	
SELECTIVITY	A. +200 kHz	Less than 3 dBm decrease in sensitivity	-94.2		-95.2	
	B. -200 kHz	Less than 3 dBm decrease in sensitivity	-94.2		-94.2	
	C. +900 kHz	80 dB @ < 600 pps	-93.7 0 PPS		-91.7 0 PPS	
	D. -900 kHz	80 dB @ < 600 pps	-93.7 0 PPS		-91.7 0 PPS	
BLANKING		40 ± 2 usec	39.0		40.0	
365 USEC BLANKING		365 ± 5 usec	NA		NA	
PRE-AMP BANDWIDTH		4 MHz AT 3 dB down	4.0		**3.5	**2.2
PRE-SEL BANDWIDTH		4 MHz AT 3 dB down	**3.5		**3.0	
IF AMP BANDWIDTH		2 MHz AT 3 dB down	**1.2	**1.8	**2.5	2.0

SECTION II — TRANSMITTER

CHECK		SPECIFICATION	CHECK RESULTS: TRANSMITTER 1 INITIAL	TRANSMITTER 1 ADJUSTED	TRANSMITTER 2 INITIAL	TRANSMITTER 2 ADJUSTED
KLYSTRON BIAS		-125 ± 1	-126.0		*-128.0	-125.0
OSCILLATOR FREQUENCY		Channel frequency	*49.4148		*49.4178	49.4174
PERCENT OF DEVIATION		0.002%	0.00377		0.0023	0.0016
RF OUTPUT FREQUENCY		Channel frequency	***		***	
PERCENT OF DEVIATION		0.002%	***		***	
OVERALL DELAY		50 ± 0.25 usec	50.0		50.0	
VIDEO PULSE	A. SPACE	12 ± 0.2 usec	12.0		11.8	
	B. WIDTH	1.6 ± 0.1 usec	1.6		1.5	
SHAPE PULSE	A. SPACE		12.1		11.9	
	B. WIDTH	3.6 ± 0.4 usec	3.3		3.3	
KLYSTRON INPUT	A. RATIO	2:1	2.5:1		3.5:1	
	B. SPACE	12 ± 0.25 usec	NA		NA	
	C. WIDTH	24 ± .5 usec	24.0		24.0	
KLYSTRON OUTPUT	A. RATIO	2:1	2.2:1		5.0:1	
	B. SPACE	12 ± 0.25 usec	12.0		12.0	
	C. WIDTH	3.5 ± 0.5 usec	3.3		3.3	
ANTENNA INPUT	A. RATIO	5:1	5.2:1		6.0:1	
	B. SPACE	12 ± 0.25 usec	12.0		12.0	
	C. WIDTH	3.5 ± 0.5 usec	3.3		3.3	
RF POWER (PEAK)	A. ANT C.O.	3.5 KW min	5.0		4.8	
	B. DPLXR		7.8		7.6	
	C. ANT		3.3		3.6	

SECTION III PULSE GENERATION CIRCUITS			CHECK RESULTS			
CHECK		SPECIFICATION	#1 CIRCUIT		#2 CIRCUIT	
			INITIAL	ADJUSTED	INITIAL	ADJUSTED
TOTAL PULSE COUNT		7200 ± 180 pps	7156		7213	
NRB	COUNT	360 PPS	361		361	
	JITTER	6 usec max	0.5		0.5	
	DURATION	330 usec	332		330	
ARB	COUNT	1440 PPS	*1561	1441	1441	
	JITTER	6 usec max	2.0		2.2	
	DURATION	120 usec	124	120	120	
IDENTITY GENERATION	A. ID	740 ± 50 usec	740		734	
	B. EQLZR	100 ± 10 usec	101		101	
	C. TONE	6660 ± 50 pps	6695		6690	

SECTION IV ANTENNA		CHECK RESULTS			
CHECK	SPECIFICATION	#1		#2	
		INITIAL	ADJUSTED	INITIAL	ADJUSTED
ROTATION SPEED[1]	66.666 ± 134 usec	66620		66620	

SECTION V NEAR FIELD MONITOR SN —		CHECK RESULTS			
CHECK	SPECIFICATION	MONITOR 1		MONITOR 2	
		INITIAL	ADJUSTED	INITIAL	ADJUSTED
135 HZ ALARM	1.5° TO 2°	NA		NA	
	0.5° TO 0°	NA		NA	
15 HZ ALARM	228.5° TO 230.5°	NA		NA	
	221.5° TO 219.5°	NA		NA	
POWER DECREASE	3 dB	3		NA	
RECEIVER SENSITIVITY	8 dB	6		NA	

SECTION VI FAR FIELD MONITOR[3] ****		CHECK RESULTS	
CHECK	SPECIFICATION	TRANSPONDER 1	TRANSPONDER 2
DME ACCURACY			
15 HZ MOD PERCENT			
135 HZ MOD PERCENT			
ID TONE			
RECEIVER AGC			
ANTENNA SPEED[2]			
PHASE COHERENCY			

SECTION VII REMARKS

* Out-of-tolerance

** Does not meet optimum bandwidth standards in TO

*** Check was performed but test equipment was unstable

**** Not available

1 Check on one transponder only.
2 Check on one transponder only.
3 Specifications not established for far field monitor.

A. C. POWER

DATE: Mar 77

LOCATION: Wright-Patterson AFB, OH

EQUIPMENT & SERIAL NUMBER: AN/FRN-32 112

CHECK	SPECIFICATIONS	PRIME POWER			STANDBY POWER		
1. VISUAL INSPECTION		Satisfactory			Satisfactory		
2. REGULATOR INPUT		VOLTAGE INITIAL	VOLTAGE ADJUSTED	CURRENT	VOLTAGE INITIAL	VOLTAGE ADJUSTED	CURRENT
PHASE A		120		56	119		54
PHASE B		120		76	118		74
PHASE C		120		54	120		56
NEUTRAL		0		34	0		34
3. REGULATOR OUTPUT							
PHASE A							
PHASE B							
PHASE C							
NEUTRAL							

GENERATOR	MANUFACTURER: Fermont	TYPE: MB-17	SERIAL NUMBER: 72-2189
	CAPACITY: 60 KW	FREQUENCY: 60 HZ	LOAD: 25% Full Load
AUTOMATIC CHANGEOVER	MANUFACTURER: Essex Electro	TYPE: 63042340	CHANGEOVER INTERVAL: 17 Seconds

VOLTAGE REGULATOR RESPONSE

VOLTAGE REGULATOR	SPECIFICATION	AS FOUND	ADJUSTED TO: MANUALLY	ADJUSTED TO: AUTOMATIC	TIME TO ADJUST
PHASE A					
PHASE B					
PHASE C					

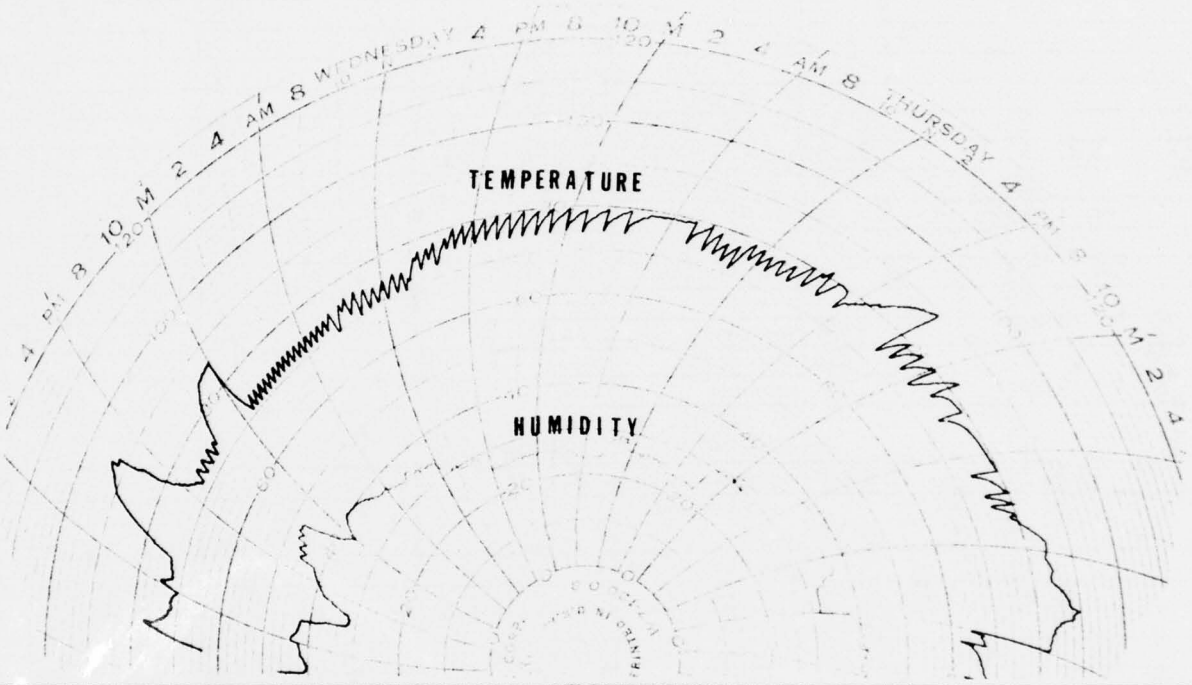
EQUIPMENT GROUNDING: See Text

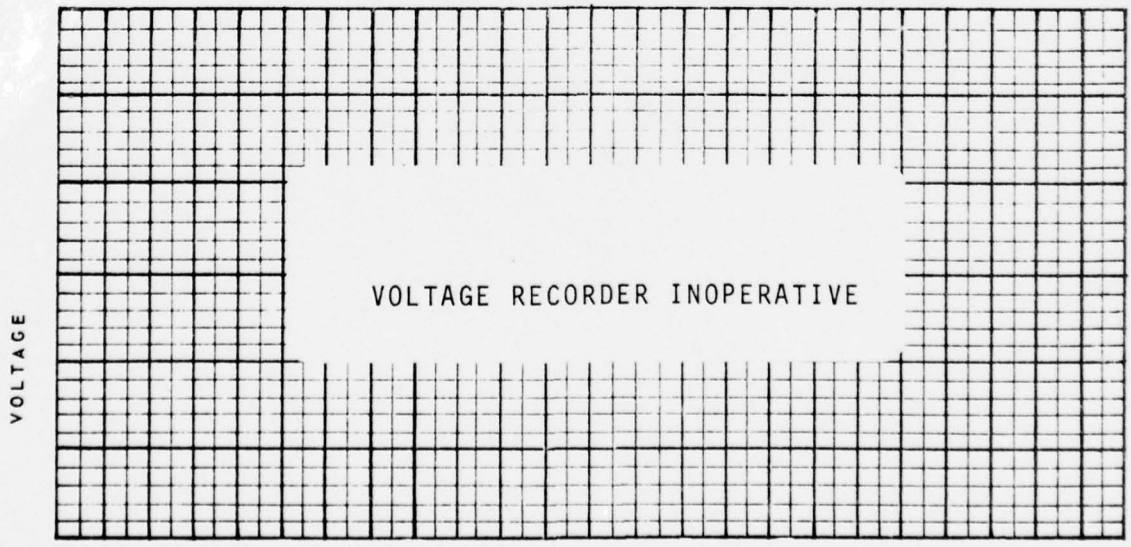
REMARKS:

ENVIRONMENTAL CONTROL

FACILITY	TECHNICIAN	DATE
AN/FRN-32A	SSgt Cartee	15 - 17 Mar 77

TYPE ENVIRONMENTAL CONTROL UNIT	BTU RATING	OUTSIDE TEMPERATURE
Trane/SA/HA-1003A	120,000	16 Mar 77, 1200 hrs 79°





REMARKS

TACAN PRE/POST FLIGHT EVALUATION DATA

DATE PERFORMED: 19 Mar 77

EQUIPMENT NOMEN.	EQUIPMENT SERIAL NUMBER	ORGANIZATION	INITIALS
AN/GRN-20C	18/40	2046 Comm GP	DRC

TRANSMITTER NO. 1		PARAMETER	T.O. SPEC.	TRANSMITTER NO. 2	
PRE-FLIGHT	POST-FLIGHT			PRE-FLIGHT	POST-FLIGHT
38	38	CR 201	30-50	38	38
42	42	CR 202	30-50	38	38
-100	-100	C-	-105± 5V	-110	-110
146	146	B+	150± 5V	152	152
-5.0	-5.0	SQUITTER	-5± 1V	-*3.6	-*3.6
72	72	BEAM CURRENT		70	70
12.5	12.5	HIGH VOLTAGE	12KV ± 1.5KV	12.6	12.6
38	38	OSCILLATOR	MAX	45	45
34	34	1ST DOUBLER	MAX	66	66
38	38	2ND DOUBLER	MAX	50	50
28	28	3RD DOUBLER	MAX	24	24
6	6	TRIPLER	MAX	22	22
48	48	AMPLIFIER	MAX	50	50
32	32	REFLECTED	MIN	14	41
100	100	INCIDENT	MAX	100	100
5	5	B.I.T.E. PWR METER	3.5 KW MIN	6	6
-93.2	-93.2	RCVR SENSITIVITY	-94 ± 3	-93.2	-93.2
12	12	NORTH PULSE COUNT	12 ± 1	12	12
6	6	AUX PULSE COUNT	6± 1	6	6
2755	2755	RECEIVER COUNT	2700± 90	2721	2721
7205	7205	C.I. COUNT	7200± 180	7117	7117
66635	66635	ANTENNA SPEED	66666±134	66635	66635

REMARKS:

*Out of Tolerance

B.I.T.E. = Built-in Test Equipment

TACAN PRE/POST FLIGHT EVALUATION DATA

DATE PERFORMED: 20 Mar 77

EQUIPMENT NOMEN.	EQUIPMENT SERIAL NUMBER	ORGANIZATION	INITIALS
AN/GRN-20C	18/40	2046 Comm GP	DRC

TRANSMITTER NO. 1		PARAMETER	T.O. SPEC.	TRANSMITTER NO. 2	
PRE-FLIGHT	POST-FLIGHT			PRE-FLIGHT	POST-FLIGHT
50	50	CR 201	30-50	36	36
52	52	CR 202	30-50	37	37
-100	-100	C-	-105± 5V	-110	-110
146	146	B+	150 ± 5V	152	152
-4.6	-4.6	SQUITTER	-5 + 1V	-*3.4	-*3.4
65	65	BEAM CURRENT		65	65
12.2	12.2	HIGH VOLTAGE	12KV + 1.5KV	12.4	12.4
33	33	OSCILLATOR	MAX	43	43
31	31	1ST DOUBLER	MAX	70	70
38	38	2ND DOUBLER	MAX	50	50
26	26	3RD DOUBLER	MAX	22	22
6	6	TRIPLER	MAX	23	23
48	48	AMPLIFIER	MAX	50	50
32	32	REFLECTED	MIN	40	40
100	100	INCIDENT	MAX	100	100
5.8	5.8	B.I.T.E. PWR METER	3.5 KW MIN	5.8	5.8
-92.7	-92.7	RCVR SENSITIVITY	-94 + 3	-91.2	-91.2
12	12	NORTH PULSE COUNT	12 ± 1	12	12
6	6	AUX PULSE COUNT	6± 1	6	6
2731	2731	RECEIVER COUNT	2700± 90	2714	2714
7157	7157	C.I. COUNT	7200± 180	7142	7142
66620	66620	ANTENNA SPEED	66666±134	66620	66620

REMARKS:

*OUT OF TOLERANCE

B.I.T.E. = Built in Test Equipment

TACAN PRE/POST FLIGHT EVALUATION DATA

DATE PERFORMED: 21 Mar 77

EQUIPMENT NOMEN.	EQUIPMENT SERIAL NUMBER	ORGANIZATION	INITIALS
AN/GRN-20C	18/40	2046 Comm GP	DRC

TRANSMITTER NO. 1		PARAMETER	T.O. SPEC.	TRANSMITTER NO. 2	
PRE-FLIGHT	POST-FLIGHT			PRE-FLIGHT	POST-FLIGHT
46	46	CR 201	30-50	37	41
50	50	CR 202	30-50	39	42
-100	-100	C-	-105± 5V	-110	-110
146	146	B+	150± 5V	152	152
-4.8	-4.8	SQUITTER	-5± 1V	-*3.5	-*3.5
70	75	BEAM CURRENT		70	70
12.8	12.4	HIGH VOLTAGE	12KV ± 1.5KV	12.6	12.6
36	34	OSCILLATOR	MAX	44	44
34	32	1ST DOUBLER	MAX	70	70
38	38	2ND DOUBLER	MAX	50	50
28	28	3RD DOUBLER	MAX	23	23
6	8	TRIPLER	MAX	23	23
48	49	AMPLIFIER	MAX	51	51
30	34	REFLECTED	MIN	42	42
100	100	INCIDENT	MAX	100	100
6.2	5.5	B.I.T.E. PWR METER	3.5 KW MIN	6.2	6.2
-91.7	-92.2	RCVR SENSITIVITY	-94± 3	-92.7	-93.2
12	12	NORTH PULSE COUNT	12 ± 1	12	12
6	6	AUX PULSE COUNT	6± 1	6	6
2725	2755	RECEIVER COUNT	2700± 90	2714	2722
7181	7123	C.I. COUNT	7200± 180	7145	7115
66620	66635	ANTENNA SPEED	66666± 134	66620	66635

REMARKS:

*Out of Tolerance

B.I.T.E. Build in Test Equipment

TVOR SUBSYSTEM MEASUREMENTS

DATE: Mar 77

LOCATION: Wright-Patterson AFB

EQUIP-SERIAL NO.: 482A TVOR TX 1-108 TX 2-111

TECHNICIAN: MSgt D. Ferguson

CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
1. VOLTAGE REGULATOR						
A. M-1	230 VAC ±1%	227.0		227.0		
B. TB-3 PIN 5 TO PIN 7	230 VAC ±1%	N/A		N/A		
2. TRANSMITTER						
A. OSC PLATE	6-15 MA	12.0		11.0		
B. 1ST AMP PLATE	20-30 MA	28.0		24.0		
C. 1ST AMP GRID	1-2 MA	1.1		1.0		
D. 2ND AMP GRID	2-4 MA	3.4		2.3		
E. 2ND AMP PLATE	30-50 MA	39.0		35.0		
F. FINAL AMP GRID	6.5-8.5 MA	8.3		6.9		
G. FINAL AMP SCRN	15-30 MA	**14.0	18.0	15.0		
H. FINAL AMP TOTAL	200-225 MA	**190.0	210.0	*185.0	200.0	
I. HI VOLTS	450-550 VDC	490.0		490.0		
J. $E_1$901 TO E1902	1215-1485 VDC	N/A		N/A		
3. MOD ELININATOR						
A. LIMITER CATHODE	15-30 MA	25.0		24.0		
B. FINAL AMP PLATE	65-115 MA	92.0		85.0		
C. DIODG LEVEL	15-30 VDC	16.0		22.0		
4. GONIOMETER MOTOR CONTROL						
A. VOLTS	115 VAC ±2%	N/A		N/A		
B. FREQUENCY	50 or 60 Hz	N/A		N/A		
C. DRIVER TOTAL	72-88 MA	N/A		N/A		
D. AMP TOTAL	105-125 MA	N/A		N/A		
5. POWER SUPPLY VOLT.						
A. J-2	450-550 VDC	520.0		519.0		
B. J-3	225-275 VDC	260.0		250.0		
C. J-4	10.8-13.2 VDC	12.6		12.6		
D. J-5	-23.75to-26.25	-26.0		-26.0		
E. J-6	-67.5to-82.5	-74.0		-70.0		
F. J-7	5.67-6.93 VAC	6.2		6.2		
48 VOLT POWER SUPPLY P817, PINS A TO D	-44 to -52 VDC	-50.0		-50.0		
6. POWER AND SWR						
A. REF CARRIER FWD POWER	40-50 WATTS	43.5		41.0		
B. REF CARRIER REFL POWER	.5 WATTS MAX	0.12		0.11		
C. SWR	1.223:1 MAX	1.11:1		1.11:1		
D. RED FWD POWER	.7-1.1 WATTS	0.900		0.860		
E. RED REFL POWER	.02 WATTS MAX	*0.048		*0.047		SEE TEXT
F. SWR	1.223:1 MAX	*1.60:1		*1.61:1		SEE TEXT
G. GREEN FWD POWER	.7-1.1 WATTS	0.900		0.890		
H. GREEN REFL POWER	.02 WATTS MAX	*0.031		*0.031		SEE TEXT
I. SWR	1.223:1 MAX	*1.45:1		*1.45:1		SEE TEXT
J. GREEN PWR MINUS RED PWR	.1 WATT MAX	0.00		0.03		
7. MONITOR						
A. PHASE TEST	±1°	+0.1		+0.1		
B. FLD STR	No Tolerance	10.0		10.0		
C. INPUT LVL	52 TO 62%	56.0		56.0	57.0	
D. 10 KC LVL	66 TO 76%	74.0		**79.0	76.0	

CONTINUED ON REVERSE SIDE.

CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
E. REF Ø LVL	50 TO 58%	51.0		51.0	50.0	
F. VAR Ø LVL	50 TO 58%	50.0		51.0	51.0	
G. 10 KC ALARM	55-65	** 54.0	56.5	58.0	56.0	
H. REF ALARM	61-71	62.0		63.0	62.0	
I. VAR ALARM	61-71	61.0		63.0	63.0	
J. AUDIO	7 TO 9 dBm	8.0		7.5	8.0	
8. GONIOMETER						
A. 90°	9910 TO 10010 Hz	9952		9964		
B. 180°	A-480 ±24 Hz	9472		9495		
C. 270°	A ±10 Hz	9952		9967		
D. 360°	A+480 ±24 Hz	10438		10446		
E. MIN PWR 1 (J-5)	45° ± 1°	45.2		45.0		
F. MIN PWR 2 (J-5)	225° ± 1°	225.5		226.0		
G. MIN PWR 3 (J-3)	135° ± 1°	135.8		135.7		
H. MIN PWR 4 (J-3)	315° ± 1°	315.5		315.5		
I. MAX PWR 1 (J-5)	135° ± 1°	135.5		134.9		
J. MAX PWR 2 (J-5)	315° ± 1°	315.0		315.6		
K. MAX PWR 3 (J-3)	45° ± 1°	45.0		44.5		
L. MAX PWR 4 (J-3)	225° ± 1°	225.0		*227.0		
M. MAX INPUT (J-4)	2.5-3.5 WATTS	* 2.44		* 2.04		SEE TEXT
N. POWER BALANCE						
(1) 135° VS 315°	2%	0.00		0.98		
(2) 135° VS 45°	2%	0.00		1.46		
(3) 135° VS 225°	2%	-0.49		0.49		
(4) 315° VS 45°	2%	0.00		0.48		
(5) 315° VS 225°	2%	-0.49		-0.48		
(6) 45° VS 225°	2%	-0.49		-0.96		
O. MAX PWR						
(1) 135°	93% OF J4	*84.43		-----		SEE TEXT
(2) 315°	93% OF J4	*84.43		-----		SEE TEXT
(3) 45°	93% OF J4	*84.43		-----		SEE TEXT
(4) 225°	93% OF J4	*84.02		-----		SEE TEXT
9. MODULATION						
A. REFERENCE	30± 2%	31.14		**37.90	30.60	
B. VARIABLE	NO GROUND TOL.	30.01		33.22		
C. IDENTIFICATION	6 TO 10%	6.66		**2.56	7.38	
D. VOICE	26 TO 30%	30.00		30.00		
10. TRANSMITTER	115200000 Hz	115199592		115198390		
FREQUENCY	0.002% ±	-.000354		-.00139		
11. MONITOR ALARM POINTS						
A. 10 KC	15 %	15		15		
B. VAR Ø	15 %	15		15		
C. COURSE	+ 1.0° ± .2	1.00		0.95		
DEVIATION	-1.0° ± .2	1.00		1.05		
12. GROUND CHECK	±4.0°	**4.21	2.96	3.94	2.32	SEE TEXT
13. TRANSMITTER						
DIFFERENTIAL	1.5°	1.04	0.94	------	------	
14. MOD. ELIM.	5% MAX	0.00		2.56		

* Overall equipment performance met AFM 55-8 requirement. T.O. Specifications have not been met.

** Out of tolerance-corrected.

VOR/TVOR PRE-POST AIRBORNE EVALUATION CHECKLIST				DATE Mar 77	
CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2	
		PRE-EVAL	POST-EVAL	PRE-EVAL	POST-EVAL
VOLTAGE REGULATOR M-1	230 VAC ±1%	228.00	228.00	228.00	228.00
TRANSMITTER OSC PLATE	6-15 MA	13.00	12.50	11.00	11.00
1ST AMP GRID	1-2 MA	1.00	1.00	1.10	1.10
1ST AMP PLATE	20-30 MA	29.00	28.00	24.00	25.00
2ND AMP GRID	2-4 MA	3.60	3.40	2.30	2.60
2ND AMP PLATE	30-50 MA	34.00	34.00	36.50	38.00
FINAL AMP GRID	6.5-8.5 MA	7.10	6.70	7.00	7.40
FINAL AMP SCREEN	15-30 MA	*13.00	*14.00	*14.00	*13.00
FINAL AMP TOTAL	200-225 MA	*190.00	*190.00	*190.00	*198.00
HI VOLTS	450-550 VDC	500.00	500.00	490.00	490.00
MODULATION ELIMINATOR					
LIMITER CATHODE	15-30 MA	26.00	25.00	22.50	23.00
FINAL AMP PLATE	65-115 MA	95.00	98.00	90.00	86.00
DIODE LEVEL	15-30 VDC	16.50	17.00	23.50	23.00
GONIOMETER MOTOR CONTROL	N/A				
VOLTS	N/A				
FREQUENCY	N/A				
DRIVER TOTAL	N/A				
AMP TOTAL	N/A				
POWER OUT					
REFERENCE CARRIER	40-50 WATTS	41.00	40.00	41.00	42.50
RED VARIABLE	.7-1.1 WATTS	0.87	0.88	0.90	0.90
GREEN VARIABLE	.7-1.1 WATTS	0.87	0.87	0.90	0.90

REMARKS:

* Overall equipment performance met AFM 55-8 requirement. T.O. Specifications have not been met.

VOR/TVOR PRE-POST AIRBORNE EVALUATION CHECKLIST				DATE Mar 77	
CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2	
		PRE-EVAL	POST-EVAL	PRE-EVAL	POST-EVAL
VOLTAGE REGULATOR M-1	230 VAC ±1%	228.00	228.00	228.00	228.00
TRANSMITTER OSC PLATE	6-15 MA	13.00	13.00	11.50	12.00
1ST AMP GRID	1-2 MA	1.25	1.10	1.20	1.20
1ST AMP PLATE	20-30 MA	28.20	28.00	25.00	26.00
2ND AMP GRID	2-4 MA	3.40	3.40	2.40	2.60
2ND AMP PLATE	30-50 MA	33.50	33.50	37.00	38.00
FINAL AMP GRID	6.5-8.5 MA	6.65	6.70	7.45	7.40
FINAL AMP SCREEN	15-30 MA	*13.75	*13.00	*13.00	*12.50
FINAL AMP TOTAL	200-225 MA	*190.00	*190.00	*188.00	*195.00
HI VOLTS	450-550 VDC	498.00	500.00	490.00	490.00
MODULATION ELIMINATOR					
LIMITER CATHODE	15-30 MA	24.00	23.00	19.00	22.00
FINAL AMP PLATE	65-115 MA	100.00	98.00	95.00	85.00
DIODE LEVEL	15-30 VDC	18.00	16.50	22.00	20.00
GONIOMETER MOTOR CONTROL	N/A				
VOLTS	N/A				
FREQUENCY	N/A				
DRIVER TOTAL	N/A				
AMP TOTAL	N/A				
POWER OUT					
REFERENCE CARRIER	40-50 WATTS	40.00	40.00	43.00	42.50
RED VARIABLE	.7-1.1 WATTS	0.89	0.90	0.90	0.82
GREEN VARIABLE	.7-1.1 WATTS	0.91	0.91	0.90	0.82

REMARKS:

* Overall equipment performance met AFM 55-8 requirement. T.O. Specifications have not been met.

VOR/TVOR PRE-POST AIRBORNF FVALUATION CHECKLIST				DATE Mar 77	
CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2	
		PRE-EVAL	POST-EVAL	PRE-EVAL	POST-EVAL
VOLTAGE REGULATOR M-1	230 VAC ±1%	228.00	228.00	228.00	228.00
TRANSMITTER OSC PLATE	6-15 MA	12.00	12.00	12.00	12.00
1ST AMP GRID	1-2 MA	1.00	1.50	1.00	1.50
1ST AMP PLATE	20-30 MA	28.00	28.00	25.00	26.00
2ND AMP GRID	2-4 MA	3.40	3.35	2.50	2.60
2ND AMP PLATE	30-50 MA	40.00	40.00	39.00	31.00
FINAL AMP GRID	6.5-8.5 MA	7.00	6.70	7.80	*6.30
FINAL AMP SCREEN	15-30 MA	18.00	18.00	*14.00	*14.00
FINAL AMP TOTAL	200-225 MA	210.00	215.00	*190.00	200.00
HI VOLTS	450-550 VDC	500.00	500.00	490.00	490.00
MODULATION ELIMINATOR					
LIMITER CATHODE	15-30 MA	22.50	26.00	22.00	22.00
FINAL AMP PLATE	65-115 MA	90.00	95.00	90.00	85.00
DIODE LEVEL	15-30 VDC	18.00	16.00	21.50	20.00
GONIOMETER MOTOR CONTROL	N/A				
VOLTS	N/A				
FREQUENCY	N/A				
DRIVER TOTAL	N/A				
AMP TOTAL	N/A				
POWER OUT					
REFERENCE CARRIER	40-50 WATTS	45.00	45.00	44.00	43.00
RED VARIABLE	.7-1.1 WATTS	0.90	0.84	0.88	0.84
GREEN VARIABLE	.7-1.1 WATTS	0.91	0.84	0.90	0.84

REMARKS:

* Overall equipment performance met AFM 55-8 requirement. T.O. Specifications have not been met.

VOR/TVOR PRE-POST AIRBORNE EVALUATION CHECKLIST				DATE Mar 77	
CHECK	SPECIFICATION	TRANSMITTER 1		TRANSMITTER 2	
		PRE-EVAL	POST-EVAL	PRE-EVAL	POST-EVAL
VOLTAGE REGULATOR M-1	230 VAC ±1%	228.00	228.00	228.00	228.00
TRANSMITTER OSC PLATE	6-15 MA	12.00	12.00	11.00	11.00
1ST AMP GRID	1-2 MA	1.00	1.00	1.00	1.00
1ST AMP PLATE	20-30 MA	28.00	28.00	24.00	24.00
2ND AMP GRID	2-4 MA	3.35	3.40	2.50	2.50
2ND AMP PLATE	30-50 MA	40.00	40.00	35.00	35.00
FINAL AMP GRID	6.5-8.5 MA	6.95	6.80	7.50	7.50
FINAL AMP SCREEN	15-30 MA	19.50	19.00	*12.00	*13.50
FINAL AMP TOTAL	200-225 MA	217.00	216.00	*198.00	200.00
HI VOLTS	450-550 VDC	500.00	500.00	490.00	490.00
MODULATION ELIMINATOR					
LIMITER CATHODE	15-30 MA	24.00	24.00	20.00	20.00
FINAL AMP PLATE	65-115 MA	87.00	98.00	88.00	92.00
DIODE LEVEL	15-30 VDC	18.50	17.00	21.00	21.50
GONIOMETER MOTOR CONTROL	N/A				
VOLTS	N/A				
FREQUENCY	N/A				
DRIVER TOTAL	N/A				
AMP TOTAL	N/A				
POWER OUT					
REFERENCE CARRIER	40-50 WATTS	45.00	46.00	43.00	43.00
RED VARIABLE	.7-1.1 WATTS	0.90	0.90	0.89	0.91
GREEN VARIABLE	.7-1.1 WATTS	0.90	0.90	0.91	0.93

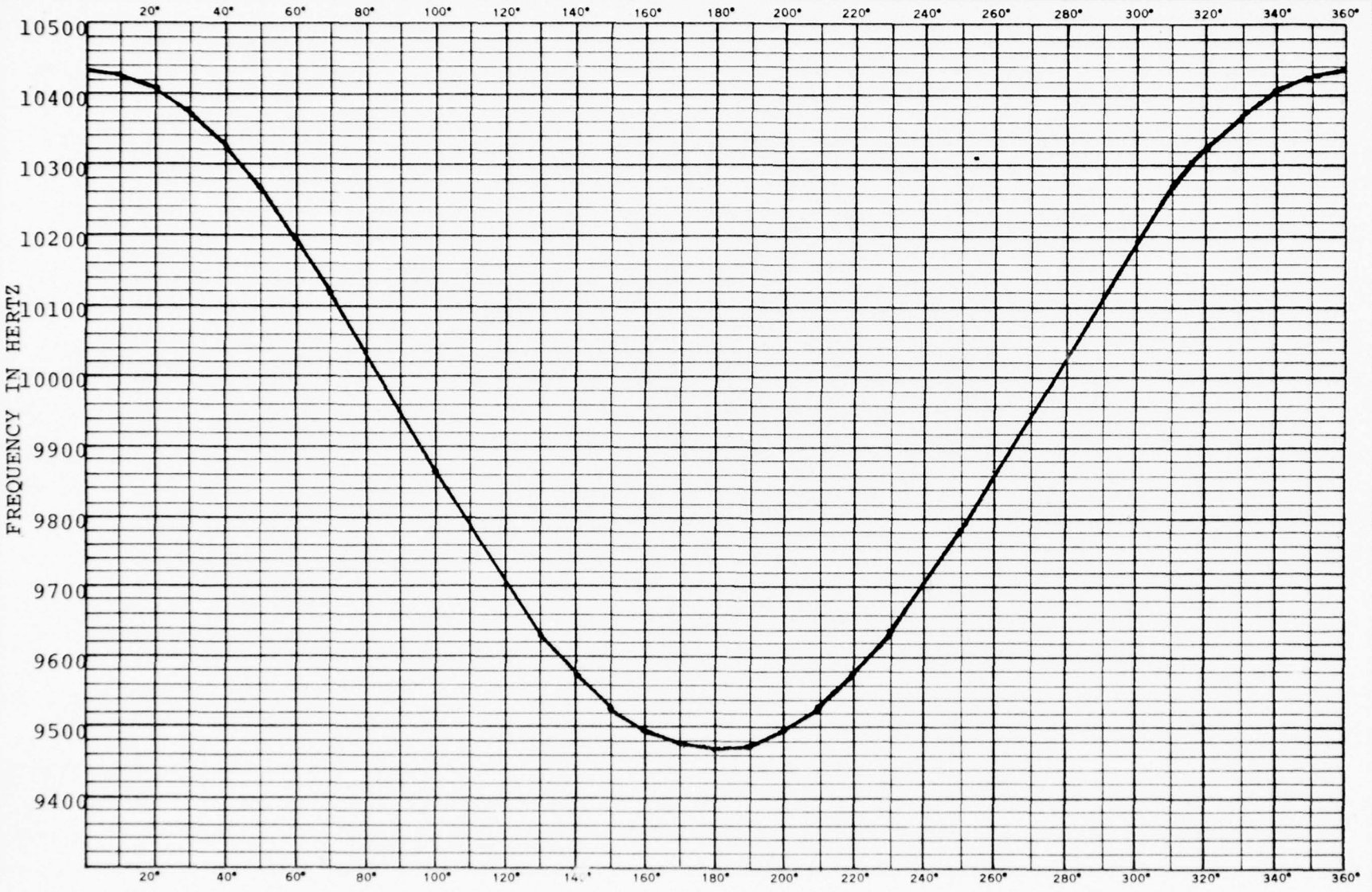
REMARKS:

* Overall equipment performance met AFM 55-8 requirement. T.O Specifications have not been met.

SUBCARRIER GENERATOR FREQUENCY CURVE

DATE: Mar 77

GONIOMETER 1 | H 1 -0.2° | | | COMPUTED BY: MSgt Ferguson



TAB: E-7-1

AFCS FORM MAY 71 243 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

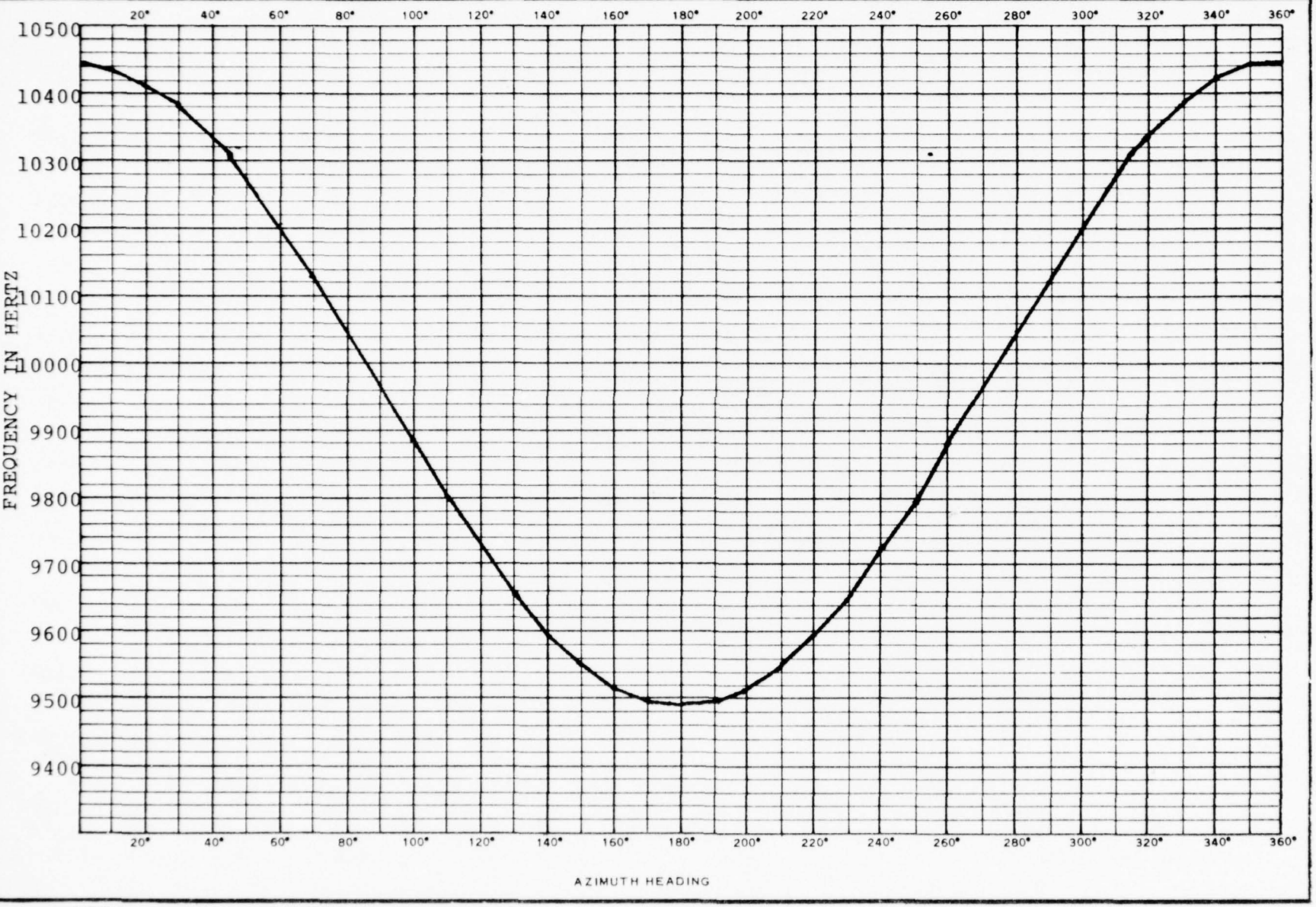
☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

SUBCARRIER GENERATOR FREQUENCY CURVE

DATE: Mar 77

GONIOMETER 2 | H 1 -1.0°

COMPUTED BY: MSgt Ferguson



TAB: E-7-2

AFCS FORM 243 MAY 71 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

VOR/TVOR
GROUND CHECK DATA

UNIT: 2046 Communications Group

DATE: Mar 77

OBSERVERS (Grade and Name)

MSgt D. Ferguson
MSgt J. Ramsey

EQUIPMENT NUMBER: 1 INITIAL

A	RUN 1				RUN 2				F
FIELD DETECTOR AZIMUTH	B MONITOR COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	B COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	AVERAGE ERROR $\frac{E+E}{2}$
0	359.79	0.2	359.59	0.41	359.70	0.2	359.50	0.50	0.46
15	14.26	0.2	14.06	0.94	14.29	0.2	14.09	0.91	0.93
30	29.64	0.2	29.44	0.56	29.69	0.2	29.49	0.51	0.54
45	45.58	0.1	45.48	-0.48	45.58	0.1	45.48	-0.48	-0.48
60	61.62	0.0	61.62	-1.62	61.69	0.0	61.69	-1.69	-1.66
75	77.10	-0.1	77.20	-2.20	77.08	-0.1	77.18	-2.18	-2.19
90	91.57	-0.1	91.67	-1.67	91.53	-0.1	91.63	-1.63	-1.65
105	106.20	-0.1	106.30	-1.30	105.94	-0.1	106.04	-1.04	-1.17
120	120.31	-0.1	120.41	-0.41	120.28	-0.1	120.38	-0.38	-0.40
135	135.10	0.0	135.10	-0.10	135.10	0.0	135.10	-0.10	-0.10
150	149.81	0.1	149.71	0.29	149.78	0.1	149.68	0.32	0.31
165	164.89	0.1	164.79	0.21	164.80	0.1	164.70	0.30	0.26
180	179.08	0.1	178.98	1.02	178.98	0.1	178.88	1.12	1.07
195	193.76	0.1	193.66	1.34	193.68	0.1	193.58	1.42	1.38
210	209.23	0.1	209.13	0.87	209.08	0.1	208.98	1.02	0.95
225	225.79	0.1	225.69	-0.69	225.67	0.1	225.57	-0.57	-0.63
240	242.05	0.0	242.05	-2.05	242.06	0.0	242.06	-2.06	-2.06
255	257.72	-0.1	257.82	-2.82	257.74	-0.1	257.84	-2.84	-2.83
270	272.31	-0.2	272.51	-2.51	272.32	-0.2	272.52	-2.52	-2.52
285	286.53	-0.1	286.63	-1.63	286.62	-0.1	286.72	-1.72	-1.68
300	301.20	-0.1	301.30	-1.30	301.40	-0.1	301.50	-1.50	-1.40
315	316.05	0.0	316.05	-1.05	316.08	0.0	316.08	-1.08	-1.07
330	330.50	0.1	330.40	-0.40	330.51	0.1	330.41	-0.41	-0.41
345	345.63	0.1	345.53	-0.53	345.69	0.1	345.59	-0.59	-0.56

TYPED NAME AND GRADE OF SECTION SUPERVISOR

SIGNATURE

VOR/TVOR GROUND CHECK DATA

UNIT: 2046 Communications Group

DATE: Mar 77

OBSERVERS (Grade and Name): MSgt D. Ferguson, MSgt J. Ramsey

EQUIPMENT NUMBER: 2 INITIAL

A	RUN 1				RUN 2				F
FIELD DETECTOR AZIMUTH	B MONITOR COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	B COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	AVERAGE ERROR E+E / 2
0	0.50	0.2	0.30	-0.30	0.88	0.2	0.68	-0.68	-0.49
15	15.00	0.2	14.80	0.20	15.31	0.2	15.11	-0.11	0.05
30	30.28	0.2	30.08	-0.08	30.57	0.2	30.37	-0.37	-0.23
45	46.02	0.1	45.92	-0.92	46.09	0.1	45.99	-0.99	-0.96
60	62.09	0.0	62.09	-2.09	61.87	0.0	61.87	-1.87	-1.98
75	77.00	-0.1	77.10	-2.10	76.87	-0.1	76.97	-1.97	-2.04
90	91.40	-0.1	91.50	-1.50	91.31	-0.1	91.41	-1.41	-1.46
105	105.68	-0.1	105.78	-0.78	105.48	-0.1	105.58	-0.58	-0.68
120	120.00	-0.1	120.10	-0.10	119.86	-0.1	119.96	0.04	-0.03
135	135.04	0.0	135.04	-0.04	135.00	0.0	135.00	0.0	-0.02
150	149.81	0.1	149.71	0.29	149.84	0.1	149.74	0.26	0.28
165	165.21	0.1	165.11	-0.11	165.30	0.1	165.20	-0.20	-0.16
180	179.80	0.1	179.70	0.30	179.90	0.1	179.80	0.20	0.25
195	194.50	0.1	194.40	0.60	194.62	0.1	194.52	0.48	0.54
210	210.18	0.1	210.08	-0.08	210.20	0.1	210.10	-0.10	-0.09
225	226.61	0.1	226.51	-1.51	226.66	0.1	226.56	-1.56	-1.54
240	242.91	0.0	242.91	-2.91	242.85	0.0	242.85	-2.85	-2.88
255	258.27	-0.1	258.37	-3.37	258.32	-0.1	258.42	-3.42	-3.40
270	272.60	-0.2	272.80	-2.80	272.72	-0.2	272.92	-2.92	-2.86
285	287.00	-0.1	287.10	-2.10	286.63	-0.1	286.73	-1.73	-1.92
300	301.70	-0.1	301.80	-1.80	301.45	-0.1	301.35	-1.35	-1.58
315	316.79	0.0	316.79	-1.79	316.70	0.0	316.70	-1.70	-1.75
330	331.35	0.1	331.25	-1.25	331.37	0.1	331.27	-1.27	-1.26
345	346.64	0.1	346.54	-1.54	346.65	0.1	346.55	-1.55	-1.55

TYPED NAME AND GRADE OF SECTION SUPERVISOR

SIGNATURE

DATE: Mar 77

TX 1 INITIAL

NOTE: In column for Check Points Azimuth.
0° to 180°
E = 180° + D

NOTE: For Check Points Azimuth
180° to 360°
E = 540° + D

*Record with opposite sign
**Change sign to neg
***Change sign of result

		FIRST RUN					SECOND RUN					
	A	B	C	D	E	F	B	C	D	E	F	G
	CHECK POINT AZIMUTH (Degrees)	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	AVERAGE ERROR $\frac{F+F}{2}=G$
1	000	181.95	-0.2	-181.75	1.75	1.75	182.00	-0.2	-181.80	1.80	1.80	1.78
2	015	167.51	-0.2	-167.31	-12.69	2.31	167.55	-0.2	-167.35	-12.65	2.35	2.33
3	030	152.49	-0.2	-152.29	-27.71	2.29	152.36	-0.2	-152.16	-27.84	2.16	2.23
4	045	136.72	-0.1	-136.62	-43.38	1.62	136.76	-0.1	-136.66	-43.34	1.66	1.64
5	060	120.54	0.0	-120.54	-59.46	0.54	120.72	0.0	-120.72	-59.28	0.72	0.63
6	075	105.50	0.1	-105.60	-74.40	0.60	105.50	0.1	-105.60	-74.40	0.60	0.60
7	090	90.84	0.1	-90.94	-89.06	0.94	91.00	0.1	-91.10	-88.90	1.10	1.02
8	105	76.29	0.1	-76.39	-103.61	1.39	76.38	0.1	-76.48	-103.52	1.48	1.44
9	120	61.68	0.1	-61.78	-118.22	1.78	61.73	0.1	-61.83	-118.17	1.83	1.81
10	135	46.52	0.0	-46.52	-133.48	1.52	46.50	0.0	-46.50	-133.50	1.50	1.51
11	150	31.30	-0.1	-31.20	-148.80	1.20	31.32	-0.1	-31.22	-148.78	1.22	1.21
12	165	15.86	-0.1	-15.76	-164.24	0.76	15.88	-0.1	-15.78	-154.22	0.78	0.77
13	180	1.00	-0.1	-0.90	-179.10	0.90	1.38	-0.1	-1.28	-178.72	1.28	1.33
14	195	346.61	-0.1	-346.5	-193.49	1.51	346.60	-0.1	-346.50	-193.50	1.50	1.51
15	210	331.10	-0.1	-331.0	-209.00	1.00	331.18	-0.1	-331.08	-208.92	1.08	1.04
16	225	315.01	-0.1	-314.91	-225.09	0.09	314.91	-0.1	-314.81	-225.19	-0.19	-0.05
17	240	298.78	0.0	-298.78	-241.22	-1.22	298.64	0.0	-298.64	-241.36	-1.36	-1.29
18	255	283.55	0.1	-283.65	-256.35	-1.35	283.46	0.1	-283.56	-256.44	-1.44	-1.40
19	270	269.28	0.2	-269.48	-270.52	-0.52	269.22	0.2	-269.42	-270.58	-0.58	-0.55
20	285	255.12	0.1	-255.22	-284.78	0.22	255.10	0.1	-255.20	-284.80	0.20	0.21
21	300	240.35	0.1	-240.45	-299.55	0.45	240.34	0.1	-240.44	-299.56	0.44	0.45
22	315	225.51	0.0	-225.51	-314.49	0.51	225.61	0.0	-225.61	-314.39	0.61	0.56
23	330	210.94	-0.1	-210.86	-329.16	0.84	210.95	-0.1	-210.85	-329.15	0.85	0.85
24	345	195.89	-0.1	-195.79	-344.21	0.79	195.89	-0.1	-195.79	-344.21	0.79	0.79

AFCS FORM NOV 74 965

REVERSE GROUND CHECK DATA

TAB: E-8-3

DATE: Mar 77

TX 2 INITIAL

NOTE: In column for Check Points Azimuth.
0° to 180°
E = 180° + D

NOTE: For Check Points Azimuth
180° to 360°
E = 540° + D

*Record with opposite sign
**Change sign to neg
***Change sign of result

	FIRST RUN						SECOND RUN					
	A	B	C	D	E	F	B	C	D	E	F	G
	CHECK POINT AZIMUTH (Degrees)	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	AVERAGE ERROR $\frac{F+F}{2}=G$
1	000	182.09	-0.2	-181.89	1.89	1.89	182.02	-0.2	-181.82	1.82	1.82	1.86
2	015	167.48	-0.2	-167.28	-12.72	2.28	167.56	-0.2	-167.36	-12.64	2.36	2.32
3	030	152.20	-0.2	-152.00	-28.00	2.00	152.12	-0.2	-151.92	-28.08	1.92	1.96
4	045	136.35	-0.1	-136.25	-43.75	1.25	136.31	-0.1	-136.21	-43.79	1.21	1.23
5	060	120.06	0.0	-120.06	-59.94	0.06	120.00	0.0	-120.00	-60.00	0.00	0.03
6	075	104.55	0.1	-104.65	-75.35	-0.35	104.46	0.1	-104.56	-75.44	-0.44	-0.40
7	090	90.00	0.1	-90.10	-89.90	0.10	89.90	0.1	-90.00	-90.00	0.00	0.05
8	105	75.52	0.1	-75.62	-104.38	0.62	75.26	0.1	-75.36	-104.64	0.36	0.49
9	120	60.85	0.1	-60.95	-119.05	0.95	60.88	0.1	-60.98	-119.02	0.98	0.97
10	135	46.02	0.0	-46.02	-133.98	1.02	46.04	0.0	-46.04	-133.96	1.04	1.03
11	150	31.25	-0.1	-31.15	-148.85	1.15	31.27	-0.1	-31.17	-148.83	1.17	1.16
12	165	16.02	-0.1	-15.92	-164.08	0.92	16.10	-0.1	-16.00	-164.00	1.00	0.96
13	180	0.88	-0.1	-0.78	-179.22	0.78	0.88	-0.1	-0.78	-179.22	0.78	0.78
14	195	347.00	-0.1	-346.90	-193.10	1.90	347.08	-0.1	-346.98	-193.02	1.98	1.94
15	210	331.68	-0.1	-331.58	-208.42	1.58	331.49	-0.1	-331.39	-208.61	1.39	1.49
16	225	315.12	-0.1	-315.02	-224.98	0.02	315.12	-0.1	-315.02	-224.98	0.02	0.02
17	240	298.78	0.0	-298.78	-241.22	-1.22	298.81	0.0	-298.81	-241.19	-1.19	-1.21
18	255	283.21	0.1	-283.31	-256.69	-1.69	283.14	0.1	-283.24	-256.76	-1.76	-1.73
19	270	268.80	0.2	-269.00	-271.00	-1.00	268.81	0.2	-269.01	-270.99	-0.99	-1.00
20	285	254.69	0.1	-254.79	-285.21	-0.21	254.70	0.1	-254.80	-285.20	-0.20	-0.21
21	300	240.10	0.1	-240.20	-299.80	0.20	240.04	0.1	-240.14	-299.86	0.14	0.17
22	315	225.30	0.0	-225.30	-314.70	0.30	225.50	0.0	-225.50	-314.50	0.50	0.40
23	330	211.10	-0.1	-211.00	-329.00	1.00	211.08	-0.1	-210.98	-329.02	0.98	0.99
24	345	196.00	-0.1	-195.00	-344.10	0.90	196.00	-0.1	-195.90	-344.10	0.90	0.90

AFCS FORM NOV 74 965

REVERSE GROUND CHECK DATA

TAB: E-8-4

ERROR COMPUTATION WORKSHEET

DATE: Mar 77

A	EQUIPMENT NO. 1				EQUIPMENT NO. 2			
	B	C	D	E	F	G	H	I
CHECK POINT AZIMUTH (Degrees)	NORMAL GROUND CHECK ERROR	REVERSE GROUND CHECK ERROR	ANTENNA ERROR $\frac{B+C}{2}$	GONIOMETER ERROR $\frac{B-C}{2}$	NORMAL GROUND CHECK ERROR	REVERSE GROUND CHECK ERROR	ANTENNA ERROR $\frac{F+G}{2}$	GONIOMETER ERROR $\frac{F-G}{2}$
0	0.46	1.78	1.12	-0.66	-0.49	1.86	0.69	-1.18
15	0.93	2.33	1.63	-0.70	0.05	2.32	1.19	-1.14
30	0.54	2.23	1.39	-0.85	-0.23	1.96	0.87	-1.10
45	-0.48	1.64	0.58	-1.06	-0.96	1.23	0.14	-1.10
60	-1.66	0.63	-0.52	-1.15	-1.98	0.03	-0.98	-1.00
75	-2.19	0.60	-0.80	-1.40	-2.04	-0.40	-1.22	-0.82
90	-1.65	1.02	-0.32	-1.34	-1.46	0.05	-0.71	-0.76
105	-1.17	1.44	0.14	-1.31	-0.68	0.49	-0.10	-0.59
120	-0.40	1.81	0.71	-1.11	-0.03	0.97	0.47	-0.50
135	-0.10	1.51	0.71	-0.81	-0.02	1.03	0.51	-0.53
150	0.31	1.21	0.76	-0.45	0.28	1.16	0.72	-0.44
165	0.26	0.77	0.52	-0.26	-0.16	0.96	0.40	-0.56
180	1.07	1.33	1.20	-0.13	0.25	0.78	0.52	-0.27
195	1.38	1.51	1.45	-0.07	0.54	1.94	1.24	-0.70
210	0.95	1.04	1.00	-0.05	-0.09	1.49	0.70	-0.80
225	-0.63	-0.05	-0.34	-0.29	-1.54	0.02	-0.76	-0.78
240	-2.06	-1.29	-1.68	-0.39	-2.88	-1.21	-2.05	-0.84
255	-2.83	-1.40	-2.12	-0.72	-3.40	-1.73	-2.57	-0.84
270	-2.52	-0.55	-1.54	-0.99	-2.86	-1.00	-1.93	-0.93
285	-1.68	0.21	-0.74	-0.95	-1.92	-0.21	-1.07	-0.86
300	-1.40	0.45	-0.48	-0.93	-1.58	0.17	-0.71	-0.88
313	-1.07	0.56	-0.26	-0.82	-1.75	0.40	-0.68	-1.08
330	-0.41	0.85	0.22	-0.63	-1.26	0.99	-0.14	-1.13
345	-0.56	0.79	0.12	-0.68	-1.55	0.90	-0.33	-1.23

REMARKS:

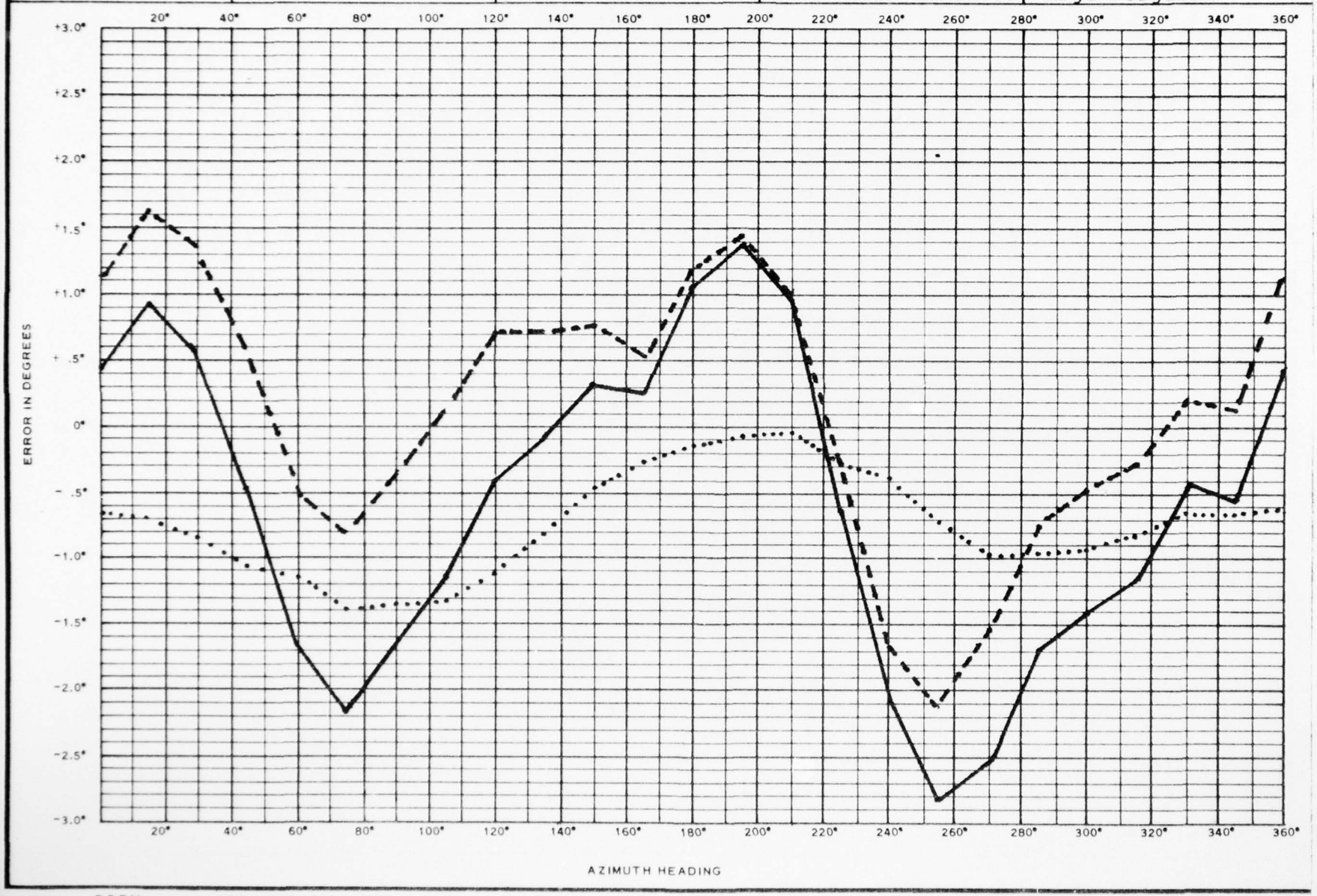
Initial Ground Checks

INITIAL GROUND CHECKS TVOR TOTAL ERROR CURVE

DATE: Mar 77

TRANSMITTER 1 | TOTAL ERROR——— | ANTENNA ERROR------ | GONIOMETER ERROR...

COMPUTED BY: MSgt Ferguson



TAB: E-9-1

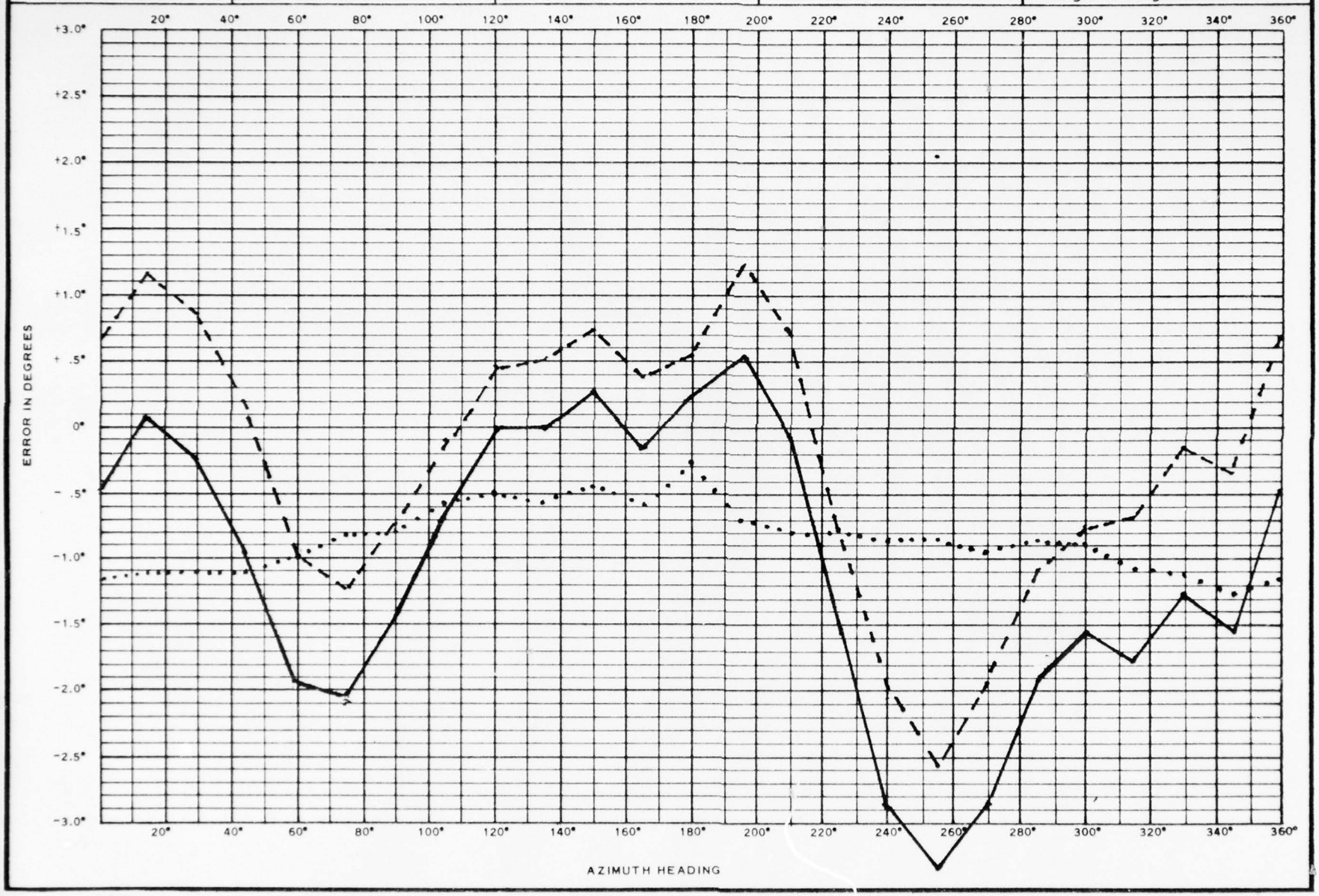
☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

INITIAL GROUND CHECKS TVOR TOTAL ERROR CURVE

DATE: Mar 77

TRANSMITTER 2 | TOTAL ERROR ——— | ANTENNA ERROR ----- | GONIOMETER ERROR..

COMPUTED BY: MSgt Ferguson



TAB; E-9-2

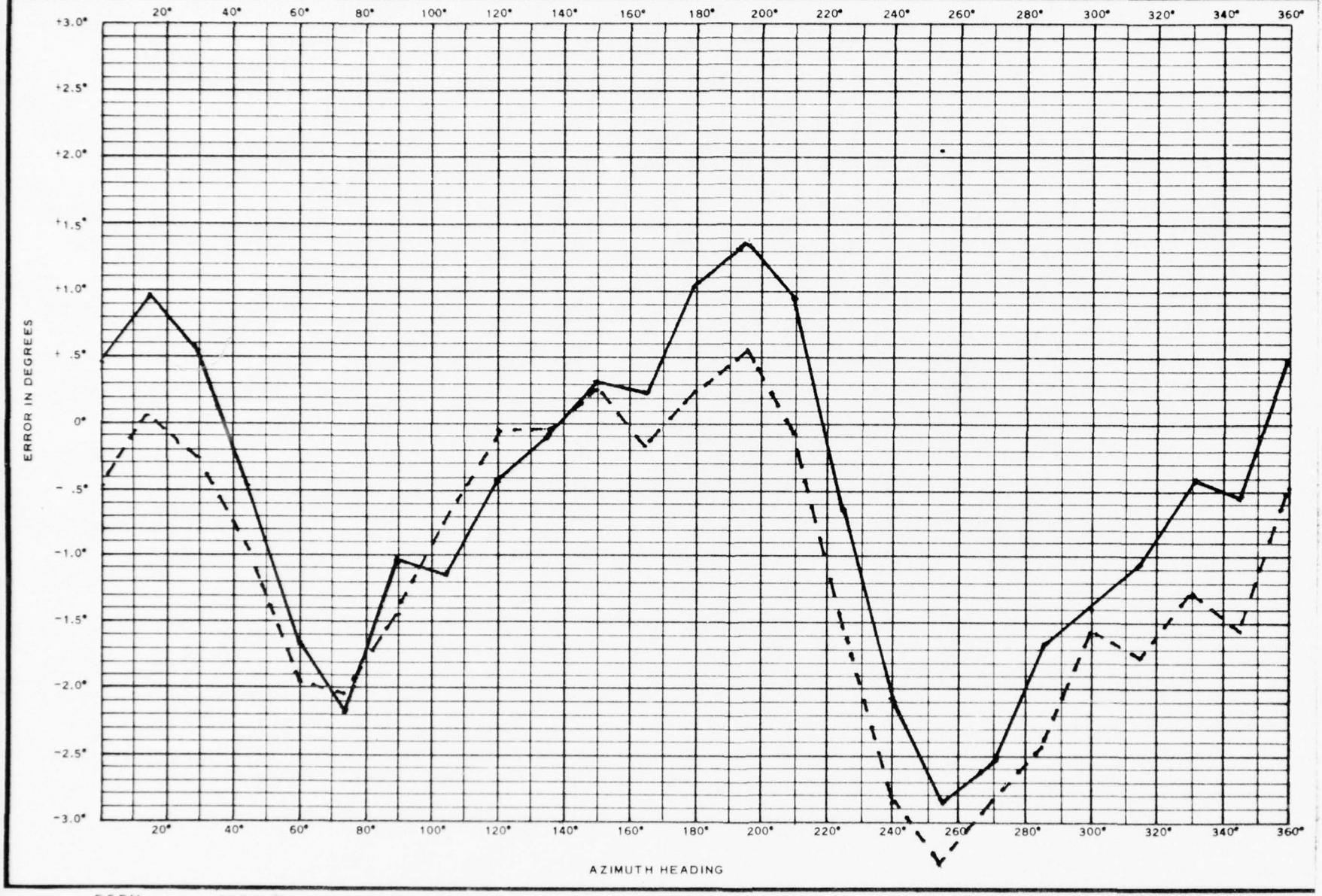
AFCS FORM MAY 71 243 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

INITIAL GROUND CHECKS **VOR/TVOR GROUND ERROR CURVE**

DATE Mar 77

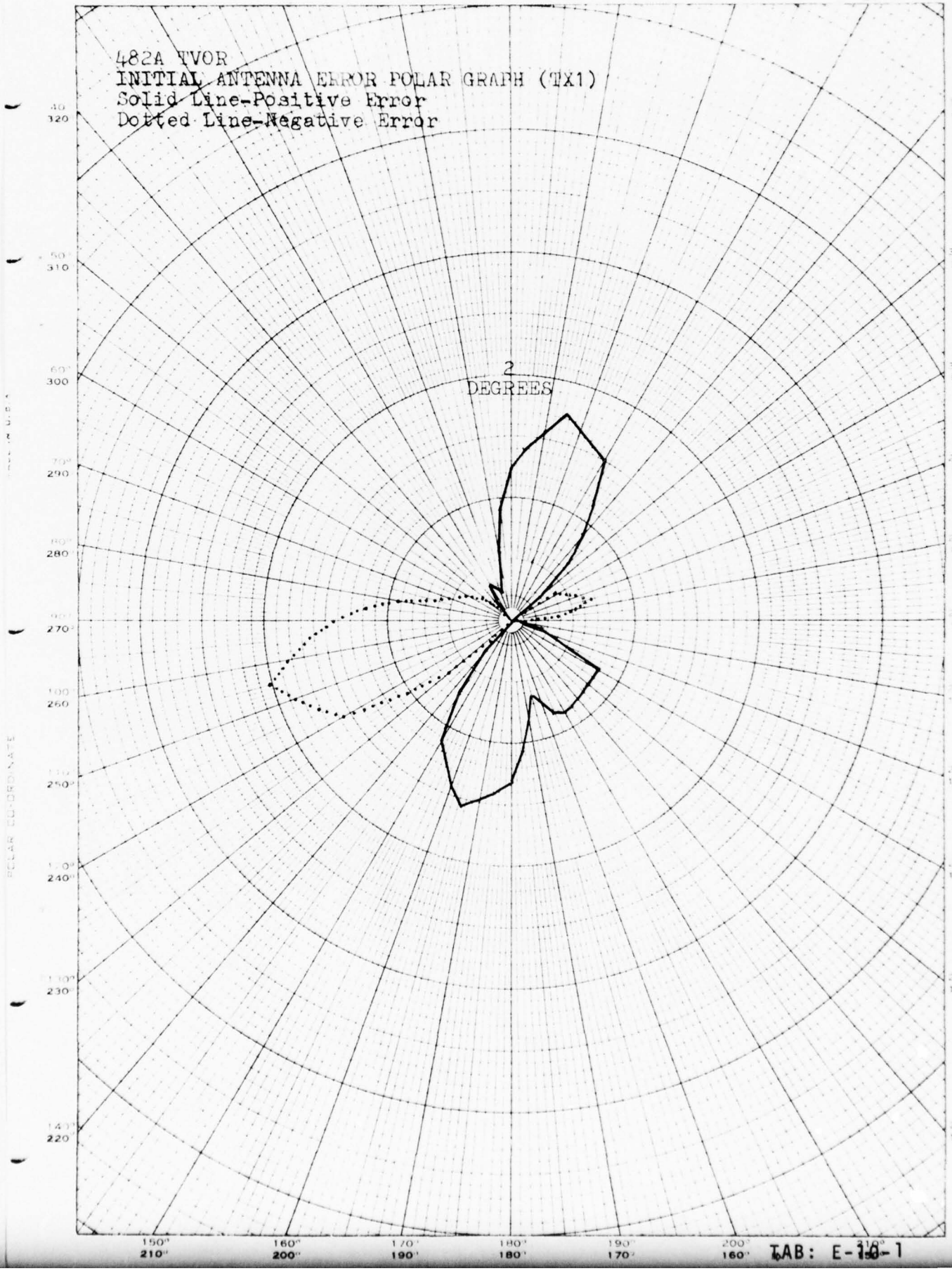
ERROR SPREAD	EQUIPMENT NR 1	EQUIPMENT NR 2	TRANSMITTER DIFFERENTIAL	COMPUTED BY
	4.21°	3.94°	1.04°	MSgt Ferguson

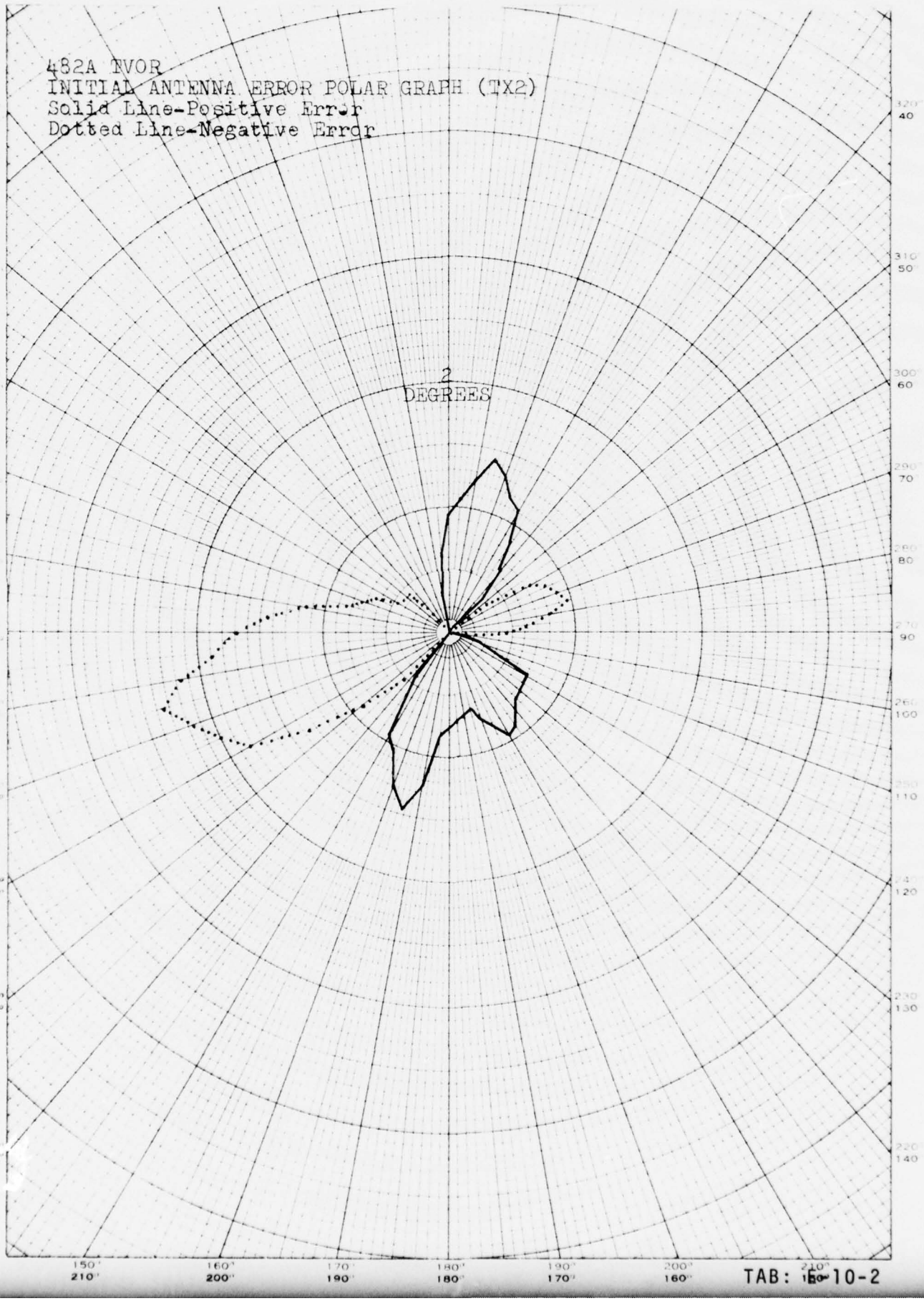


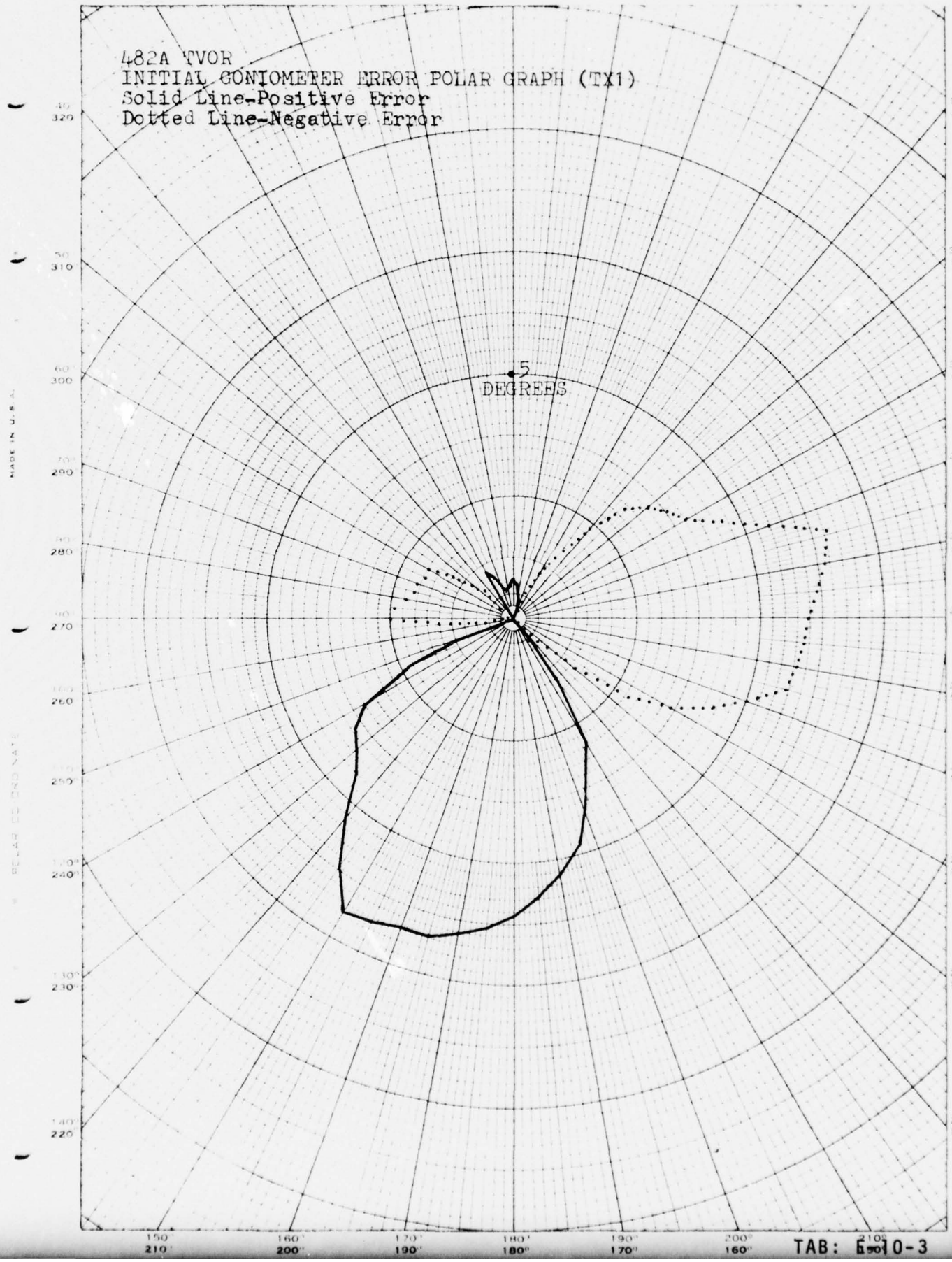
TAB: E-9-3

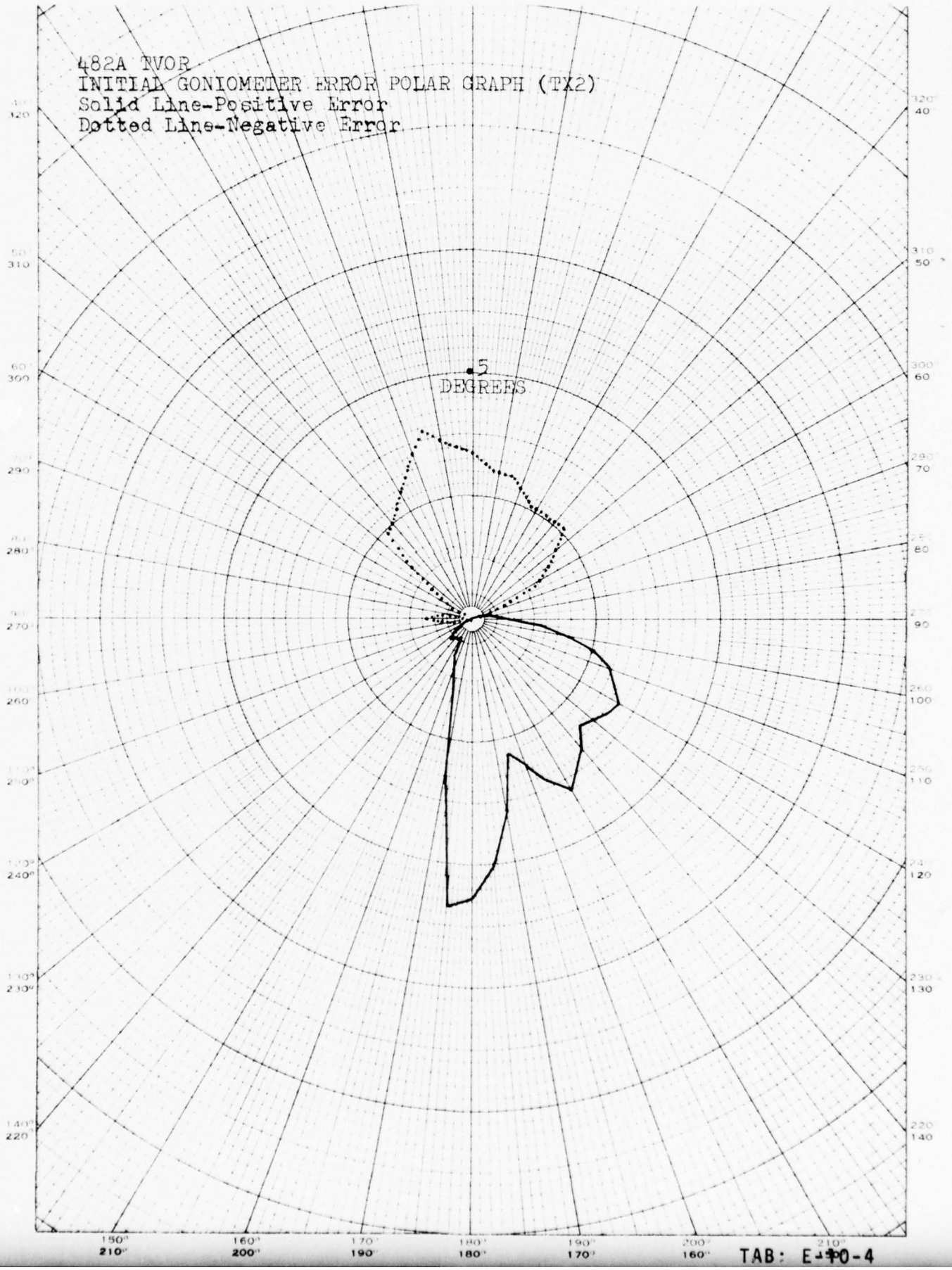
AFCS FORM MAY 71 243 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

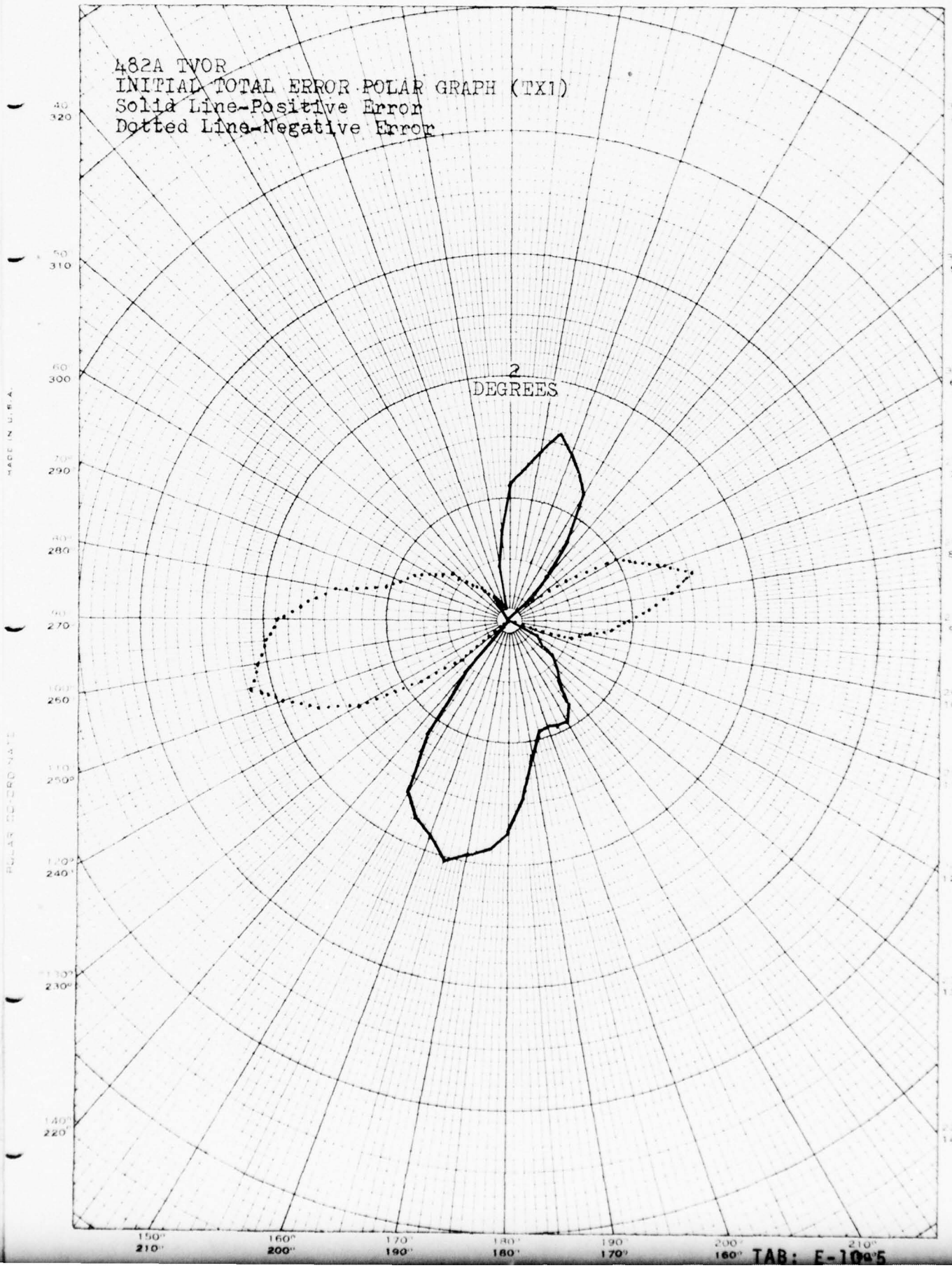
☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

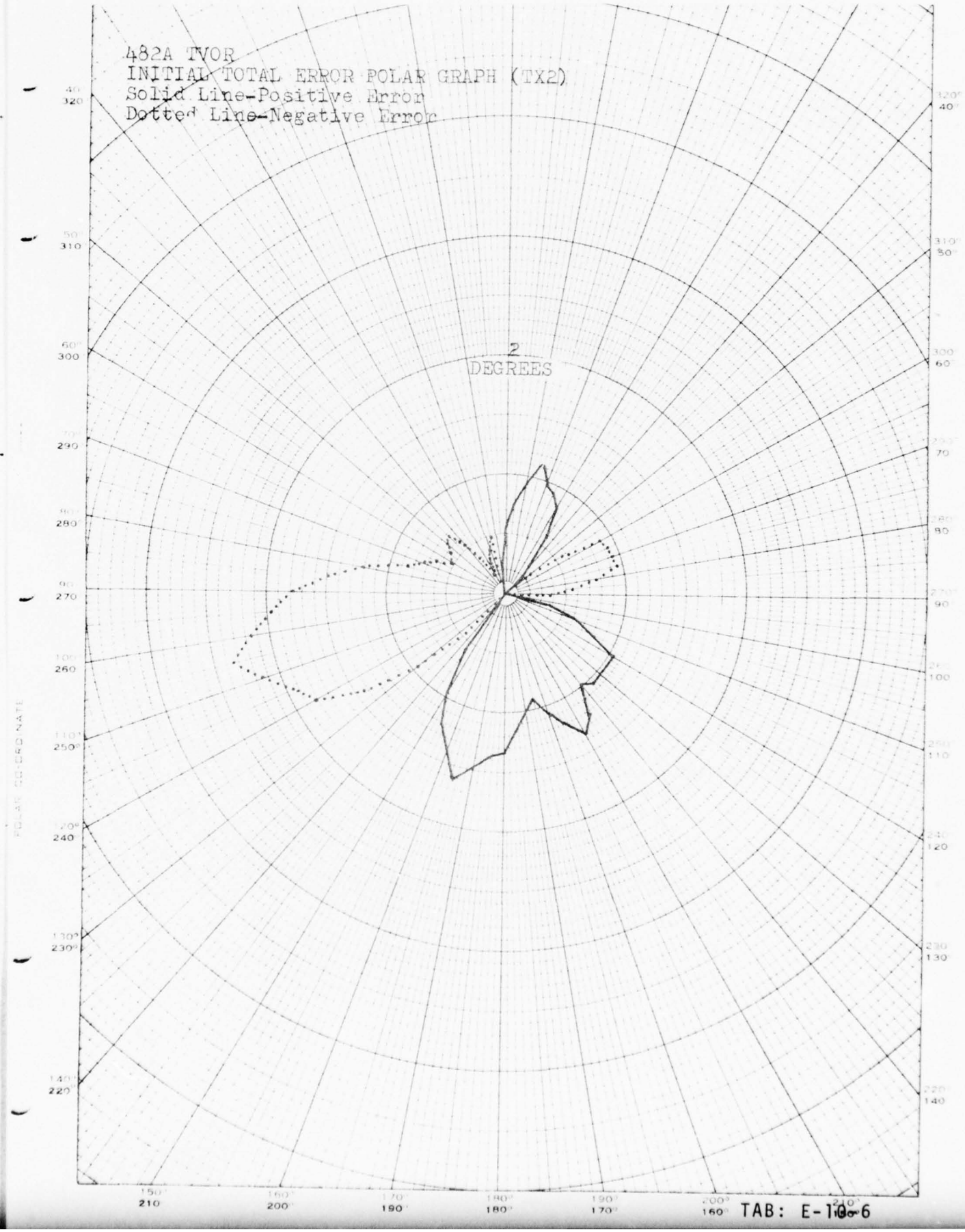

482A TVOR
INITIAL ANTENNA ERROR POLAR GRAPH (TX1)
Solid Line-Positive Error
Dotted Line-Negative Error
2
DEGREES
POLAR COORDINATE


482A TVOR
INITIAL ANTENNA ERROR POLAR GRAPH (TX2)
Solid Line-Positive Error
Dotted Line-Negative Error
2
DEGREES
40 320
50 310
60 300
70 290
80 280
90 270
100 260
110 250
120 240
130 230
140 220
320 40
310 50
300 60
290 70
280 80
270 90
260 100
250 110
240 120
230 130
220 140
150 210
160 200
170 190
180
190 170
200 160
210 150


482A TVOR
INITIAL GONIOMETER ERROR POLAR GRAPH (TX1)
Solid Line-Positive Error
Dotted Line-Negative Error
5
DEGREES
MADE IN U.S.A.
40
320
50
310
60
300
70
290
80
280
90
270
100
260
110
250
120
240
130
230
140
220
150
210
160
200
170
190
180


482A TVOR
INITIAL GONIOMETER ERROR POLAR GRAPH (TX2)
Solid Line-Positive Error
Dotted Line-Negative Error
.5
DEGREES
150° 210°
160° 200°
170° 190°
180°
190° 170°
200° 160°
210°


482A TVOR
INITIAL TOTAL ERROR POLAR GRAPH (TX1)
Solid Line-Positive Error
Dotted Line-Negative Error
2
DEGREES
MADE IN U.S.A.
POLAR RECTANGULAR

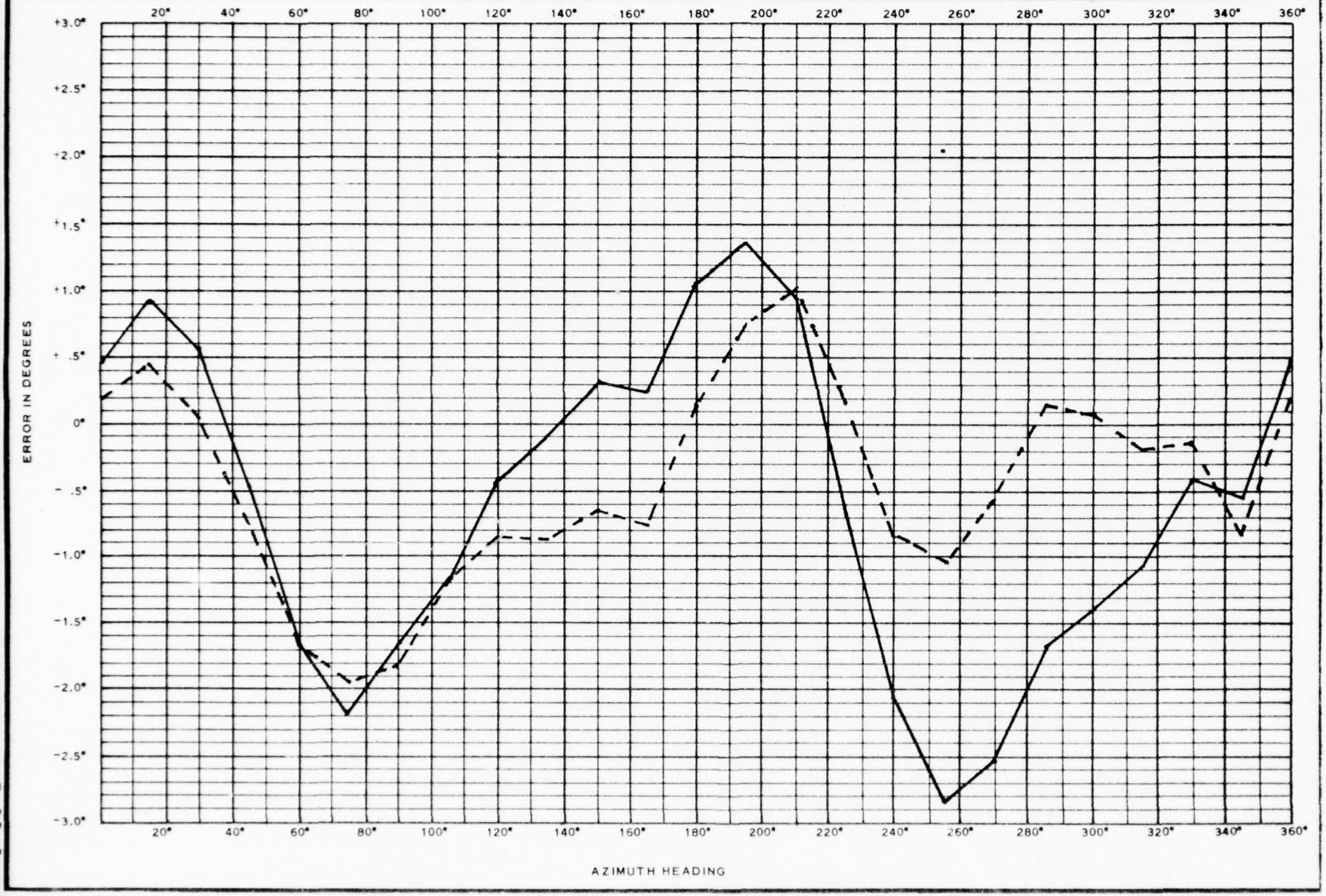

482A TVOR
INITIAL TOTAL ERROR POLAR GRAPH (TX2)
Solid Line-Positive Error
Dotted Line-Negative Error
2
DEGREES
POLAR COORDINATE
40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°
150° 210°
160° 200°
170° 190°
180°
190° 170°
200° 160°
320° 40°
310° 50°
300° 60°
290° 70°
280° 80°
270° 90°
260° 100°
250° 110°
240° 120°
230° 130°
220° 140°

INITIAL VS FINAL VOR GROUND ERROR COMPARISON

DATE: Mar 77

TRANSMITTER 1 | INITIAL ERROR_____ | FINAL ERROR--------

COMPUTED BY: MSgt Ferguson



TAB: E-11-1

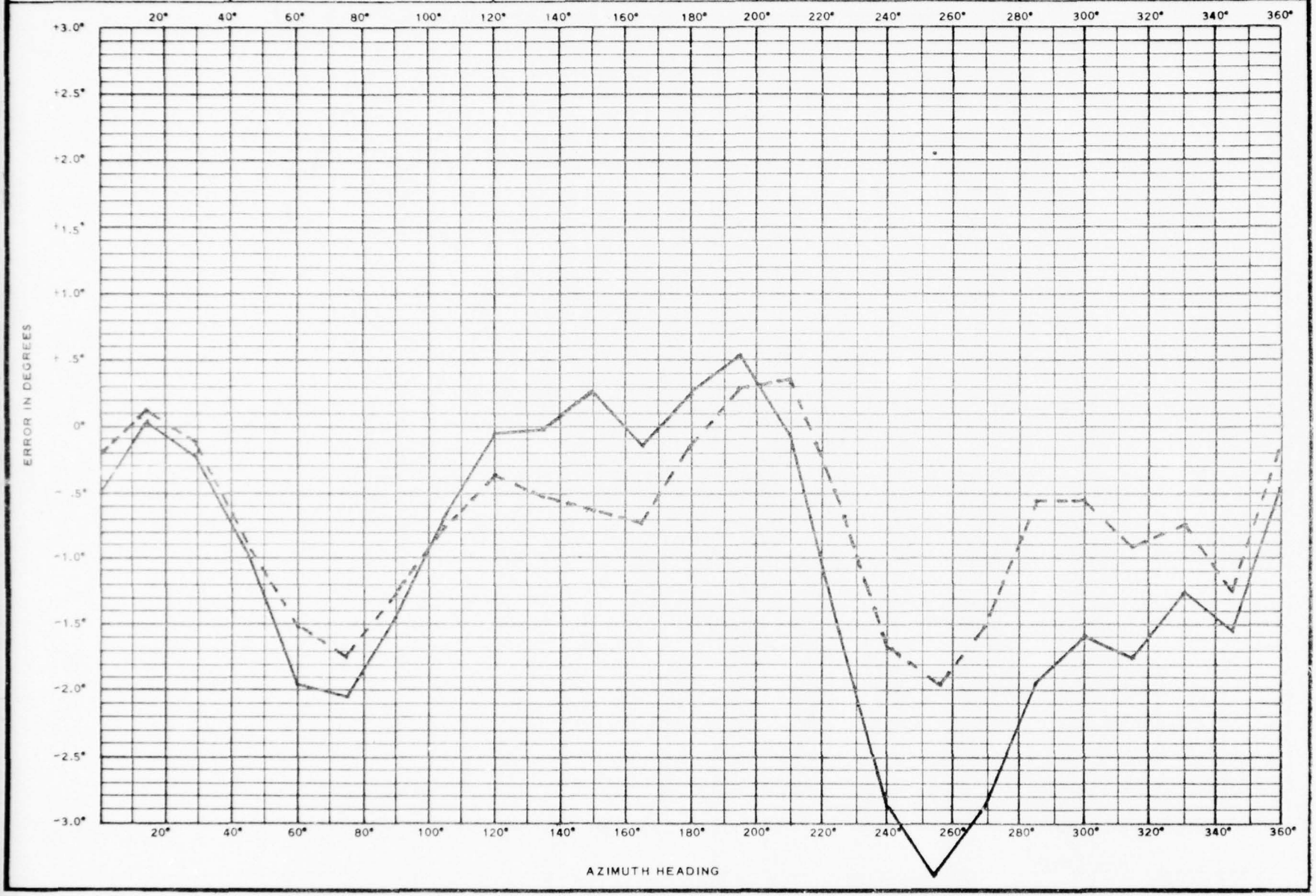
AFCS FORM MAY 71 243 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

INITIAL VS FINAL VOR GROUND ERROR COMPARISON

DATE: Mar 77

TRANSMITTER 2 | INITIAL ERROR_____ | FINAL ERROR-------- | COMPUTED BY: MSgt Ferguson



AFCS FORM MAY 71 243 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--763061/504 REGION NO. 6

TAB: F-11-2

ERROR COMPUTATION WORKSHEET

DATE: Mar 77

A	EQUIPMENT NO. 1				EQUIPMENT NO. 2			
A CHECK POINT AZIMUTH (Degrees)	B NORMAL GROUND CHECK ERROR	C REVERSE GROUND CHECK ERROR	D ANTENNA ERROR $\frac{B+C}{2}$	E GONIOMETER ERROR $\frac{B-C}{2}$	F NORMAL GROUND CHECK ERROR	G REVERSE GROUND CHECK ERROR	H ANTENNA ERROR $\frac{F+G}{2}$	I GONIOMETER ERROR $\frac{F-G}{2}$
0	0.20	1.73	0.97	-0.77	-0.19	0.89	0.35	-0.54
15	0.45	2.01	1.23	-0.78	0.13	1.51	0.82	-0.69
30	0.05	1.40	0.73	-0.68	-0.11	1.35	0.62	-0.73
45	-0.75	0.38	-0.19	-0.57	-0.89	0.74	-0.08	-0.82
60	-1.68	-0.83	-1.26	-0.43	-1.51	-0.62	-1.07	-0.45
75	-1.95	-1.28	-1.62	-0.34	-1.74	-0.24	-0.99	-0.75
90	-1.81	-1.06	-1.44	-0.38	-1.28	0.09	-0.60	-0.69
105	-1.17	-0.82	-1.00	-0.18	-0.77	0.66	-0.06	-0.72
120	-0.85	-0.37	-0.61	-0.24	-0.35	1.01	0.33	-0.68
135	-0.87	-0.35	-0.61	-0.26	-0.51	0.85	0.17	-0.68
150	-0.64	-0.24	-0.44	-0.20	-0.63	0.69	0.03	-0.66
165	-0.75	-0.09	-0.42	-0.33	-0.73	0.39	-0.17	-0.56
180	0.14	0.55	0.35	-0.21	-0.13	0.52	0.20	-0.33
195	0.77	1.11	0.94	-0.17	0.29	1.25	0.77	-0.48
210	1.01	0.98	1.00	0.02	0.37	1.13	0.75	-0.38
225	0.17	-0.12	0.03	0.15	-0.59	0.13	-0.23	-0.36
240	-0.85	-1.22	-1.04	0.19	-1.69	-0.70	-1.20	-0.50
255	-1.03	-1.34	-1.19	0.16	-1.95	-0.90	-1.43	-0.53
270	-0.56	-0.50	-0.53	-0.03	-1.50	0.01	-0.75	-0.76
285	0.15	0.38	0.27	-0.12	-0.55	0.69	0.07	-0.62
300	0.09	0.61	0.35	-0.26	-0.55	0.89	0.17	-0.72
313	-0.19	0.60	0.21	-0.40	-0.91	0.76	-0.08	-0.84
330	-0.13	0.98	0.43	-0.56	-0.75	0.77	0.01	-0.76
345	-0.83	0.67	-0.08	-0.75	-1.25	0.36	-0.45	-0.81

REMARKS:

Final Ground Checks

VOR/TVOR GROUND CHECK DATA

UNIT: 2046 Communications Group

DATE: Mar 77

OBSERVERS (Grade and Name): MSgt D. Ferguson, MSgt J. Ramsey

EQUIPMENT NUMBER: 1 FINAL

A	RUN 1				RUN 2				F
FIELD DETECTOR AZIMUTH	B MONITOR COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	B COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	AVERAGE ERROR $\frac{E+E}{2}$
0	0.00	0.2	-0.20	0.20	0.01	0.2	-0.19	0.19	0.20
15	14.70	0.2	14.50	0.50	14.80	0.2	14.60	0.40	0.45
30	30.18	0.2	29.98	0.02	30.12	0.2	29.92	0.08	0.05
45	45.72	0.1	45.62	-0.62	45.98	0.1	45.88	-0.88	-0.75
60	61.66	0.0	61.66	-1.66	61.70	0.0	61.70	-1.70	-1.68
75	76.80	-0.1	76.90	-1.90	76.90	-0.1	77.00	-2.00	-1.95
90	91.71	-0.1	91.81	-1.81	91.70	-0.1	91.80	-1.80	-1.81
105	105.95	-0.1	106.05	-1.05	106.18	-0.1	106.28	-1.28	-1.17
120	120.70	-0.1	120.80	-0.80	120.80	-0.1	120.90	-0.90	-0.85
135	135.85	0.0	135.85	-0.85	135.88	0.0	135.88	-0.88	-0.87
150	150.72	0.1	150.62	-0.62	150.76	0.1	150.66	-0.66	-0.64
165	165.80	0.1	165.70	-0.70	165.90	0.1	165.80	-0.80	-0.75
180	179.92	0.1	179.82	0.18	180.00	0.1	179.90	0.10	0.14
195	194.32	0.1	194.22	0.78	194.35	0.1	194.25	0.75	0.77
210	209.00	0.1	208.90	1.10	209.18	0.1	209.08	0.92	1.01
225	224.81	0.1	224.71	0.29	225.05	0.1	224.95	0.05	0.17
240	240.80	0.0	240.80	-0.80	240.90	0.0	240.90	-0.90	-0.85
255	255.80	-0.1	255.90	-0.90	256.06	-0.1	256.16	-1.16	-1.03
270	270.22	-0.2	270.42	-0.42	270.50	-0.2	270.70	-0.70	-0.56
285	284.72	-0.1	284.82	0.18	284.78	-0.1	284.88	0.12	0.15
300	299.80	-0.1	299.90	0.10	299.82	-0.1	299.92	0.08	0.09
315	315.32	0.0	315.32	-0.32	315.06	0.0	315.06	-0.06	-0.19
330	330.21	0.1	330.11	-0.11	330.25	0.1	330.15	-0.15	-0.13
345	345.90	0.1	345.80	-0.80	345.96	0.1	345.86	-0.86	-0.83

TYPED NAME AND GRADE OF SECTION SUPERVISOR

SIGNATURE

DATE: Mar 77

TX 1 FINAL

NOTE: In column for Check Points Azimuth .
0° to 180°
E = 180° + D

NOTE: For Check Points Azimuth 180° to 360°
E = 540° + D

*Record with opposite sign
**Change sign to neg
***Change sign of result

		FIRST RUN					SECOND RUN					
	A	B	C	D	E	F	B	C	D	E	F	G
	CHECK POINT AZIMUTH (Degrees)	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	AVERAGE ERROR $\frac{F+F}{2}=G$
1	000	181.98	-0.2	-181.78	1.78	1.78	181.87	-0.2	-181.67	1.67	1.67	1.73
2	015	167.25	-0.2	-167.05	-12.95	2.05	167.16	-0.2	-166.96	-13.04	1.96	2.01
3	030	151.55	-0.2	-151.35	-28.65	1.35	151.64	-0.2	-151.44	-28.56	1.44	1.40
4	045	135.44	-0.1	-135.34	-44.66	0.34	135.52	-0.1	-135.42	-44.58	0.42	0.38
5	060	119.29	0.0	-119.29	-60.71	-0.71	119.06	0.0	-119.06	-60.94	-0.94	-0.83
6	075	103.71	0.1	-103.81	-76.19	-1.19	103.54	0.1	-103.64	-76.36	-1.36	-1.28
7	090	88.90	0.1	-89.00	-91.00	-1.00	88.78	0.1	-88.88	-91.12	-1.12	-1.06
8	105	74.06	0.1	-74.16	-105.84	-0.84	74.10	0.1	-74.20	-105.80	-0.80	-0.82
9	120	59.57	0.1	-59.67	-120.33	-0.33	59.49	0.1	-59.59	-120.41	-0.41	-0.37
10	135	44.71	0.0	-44.71	-135.29	-0.29	44.60	0.0	-44.60	-135.40	-0.40	-0.35
11	150	30.04	-0.1	-29.94	-150.06	-0.06	29.69	-0.1	-29.59	-150.41	-0.41	-0.24
12	165	15.02	-0.1	-14.92	-165.08	-0.08	15.00	-0.1	-14.90	-165.10	-0.10	-0.09
13	180	0.58	-0.1	-0.48	-179.52	0.48	0.72	-0.1	-0.62	-179.38	0.62	0.55
14	195	346.20	-0.1	-346.10	-193.90	1.10	346.21	-0.1	-346.11	-193.89	1.11	1.11
15	210	331.04	-0.1	-330.94	-209.06	0.94	331.12	-0.1	-331.02	-208.98	1.02	0.98
16	225	314.94	-0.1	-314.84	-225.16	-0.16	315.03	-0.1	-314.93	-225.07	-0.07	-0.12
17	240	298.72	0.0	-298.72	-241.28	-1.28	298.84	0.0	-298.84	-241.16	-1.16	-1.22
18	255	283.61	0.1	-283.71	-256.29	-1.29	283.52	0.1	-283.62	-256.38	-1.38	-1.34
19	270	269.33	0.2	-269.53	-270.47	-0.47	269.28	0.2	-269.48	-270.52	-0.52	-0.50
20	285	255.28	0.1	-255.38	-284.62	0.38	255.27	0.1	-255.37	-284.63	0.37	0.38
21	300	240.60	0.1	-240.70	-299.30	0.70	240.42	0.1	-240.52	-299.48	0.52	0.61
22	315	225.60	0.0	-225.60	-314.40	0.60	225.60	0.0	-225.60	-314.40	0.60	0.60
23	330	211.12	-.1	-211.02	-328.98	1.02	211.04	-0.1	-210.94	-329.06	0.94	0.98
24	345	195.81	-.1	-195.71	-344.29	0.71	195.72	-0.1	-195.62	-344.38	0.62	0.67

AFCS FORM NOV 74 965

REVERSE GROUND CHECK DATA

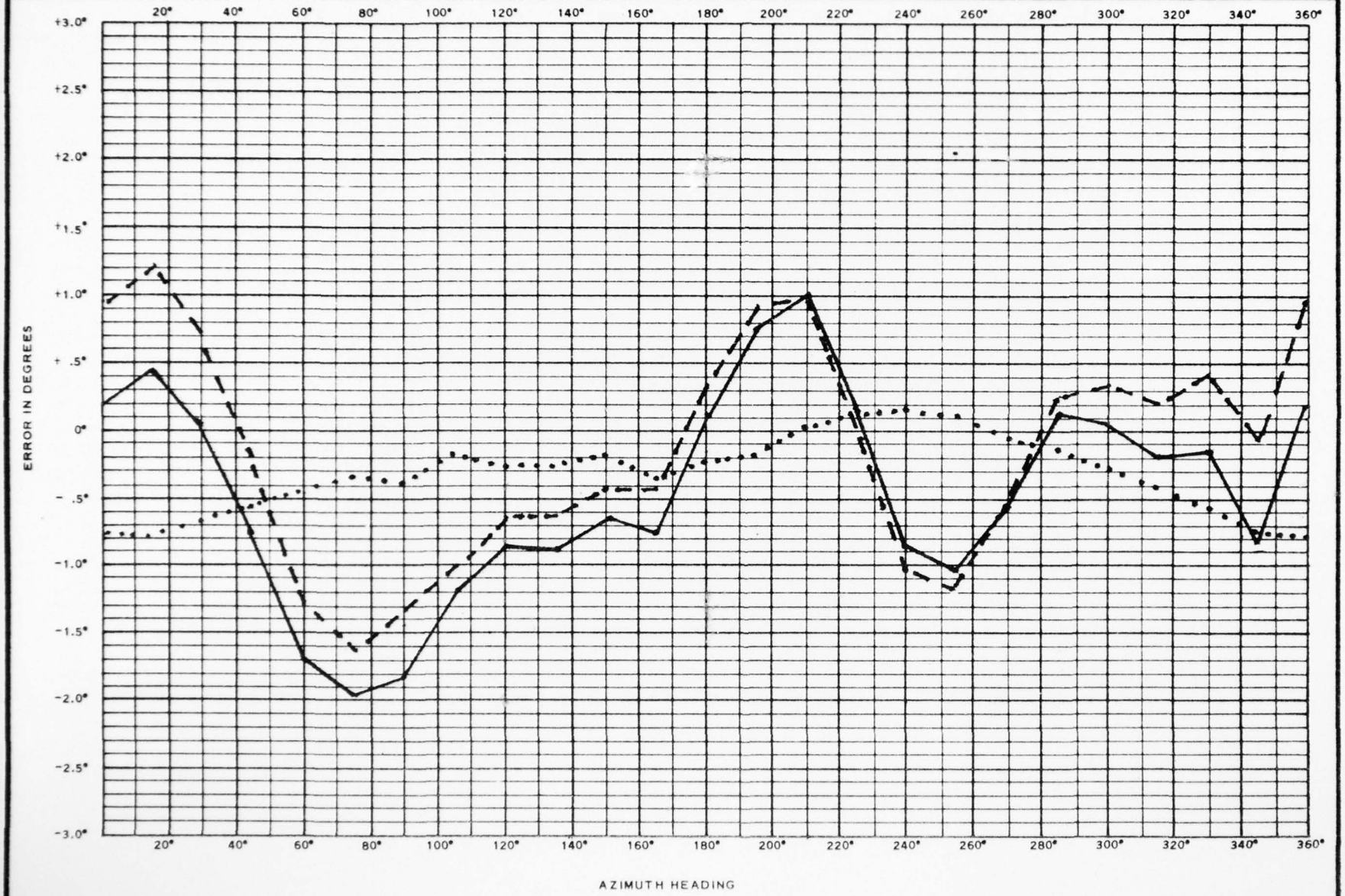
TAB: E-13-2

FINAL GROUND CHECKS TVOR TOTAL ERROR CURVE

DATE: Mar 77

TRANSMITTER 1 | TOTAL ERROR ——— | ANTENNA ERROR------ | GONIOMETER ERROR...

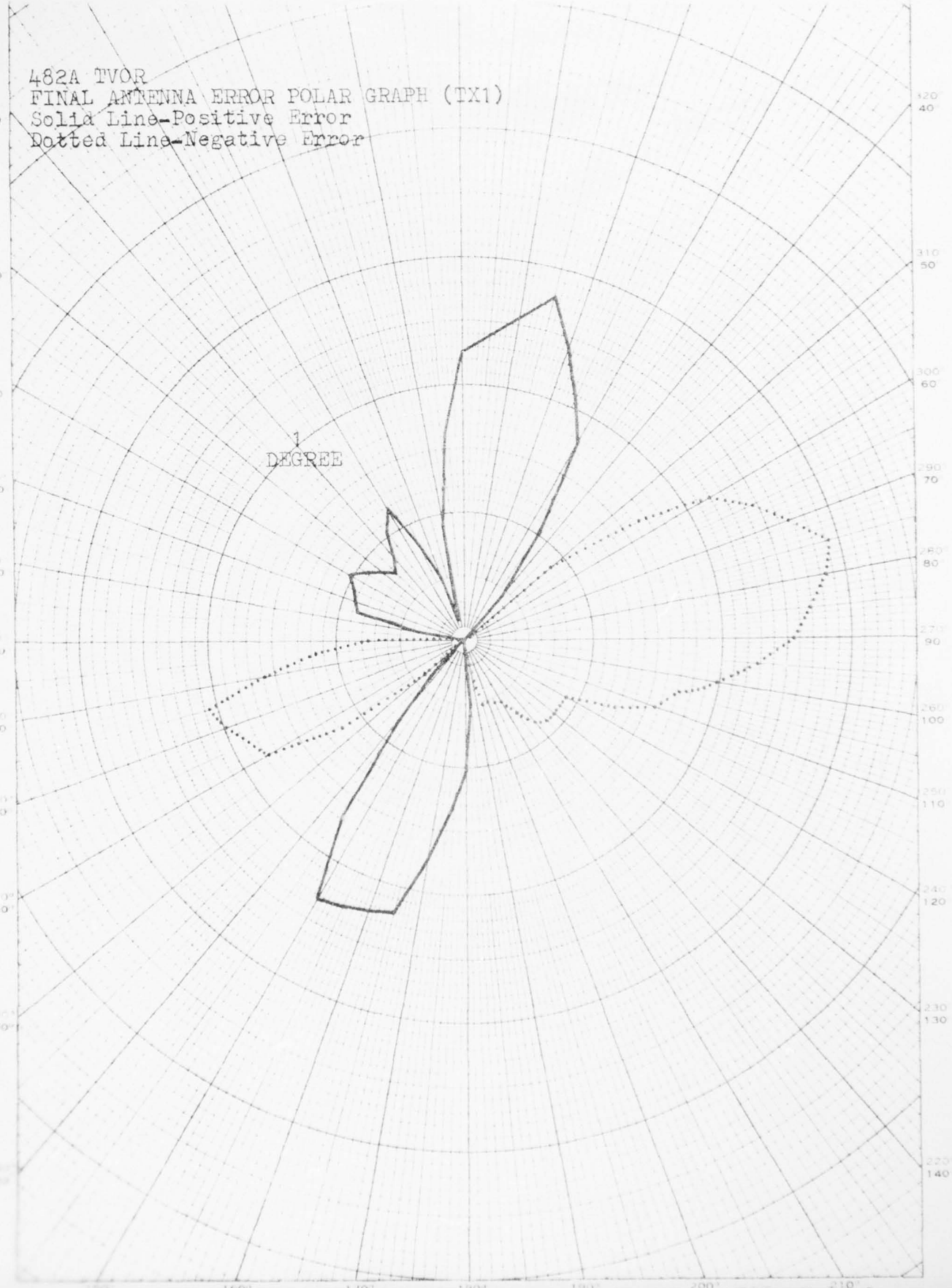
COMPUTED BY: MSgt Ferguson

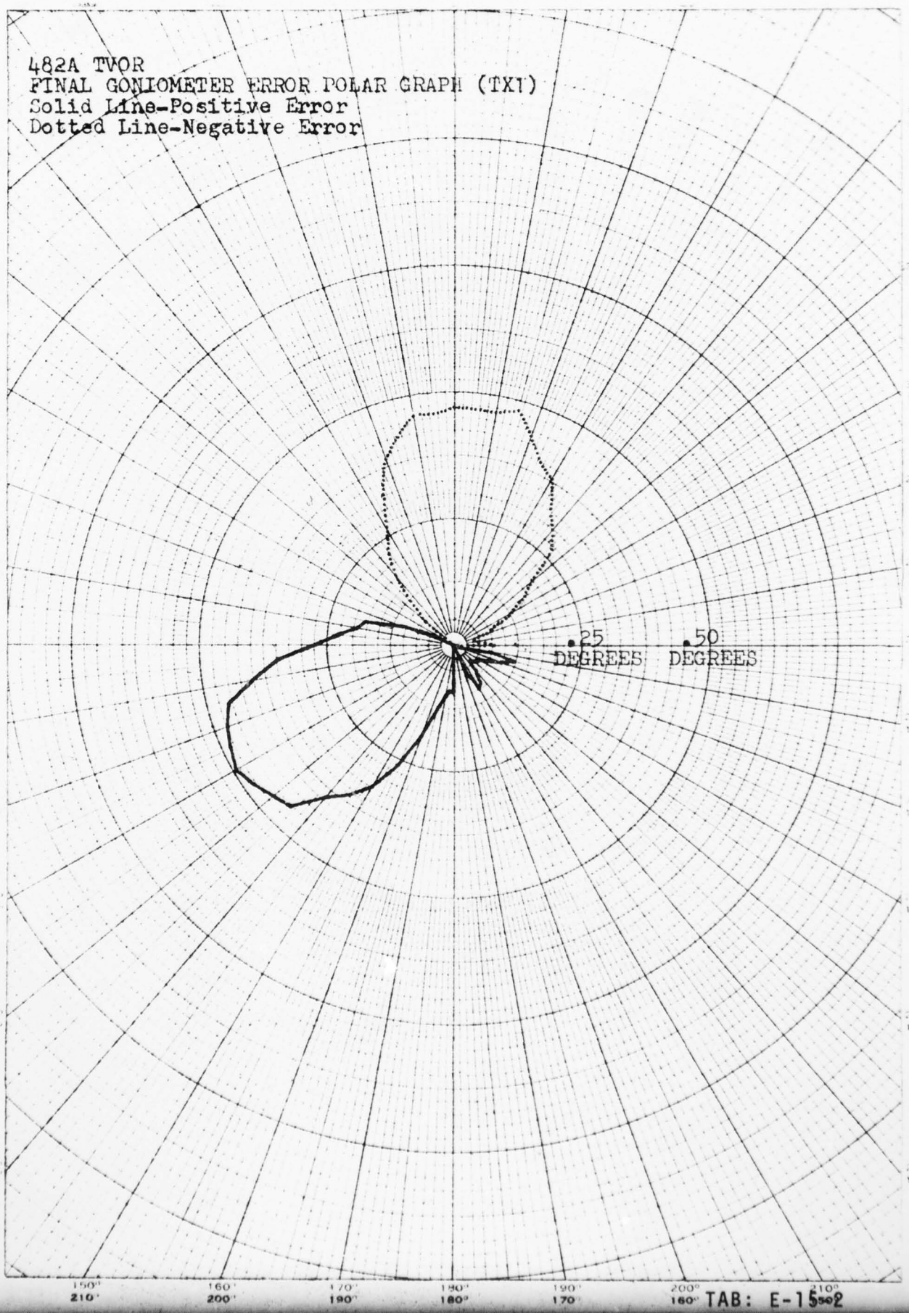


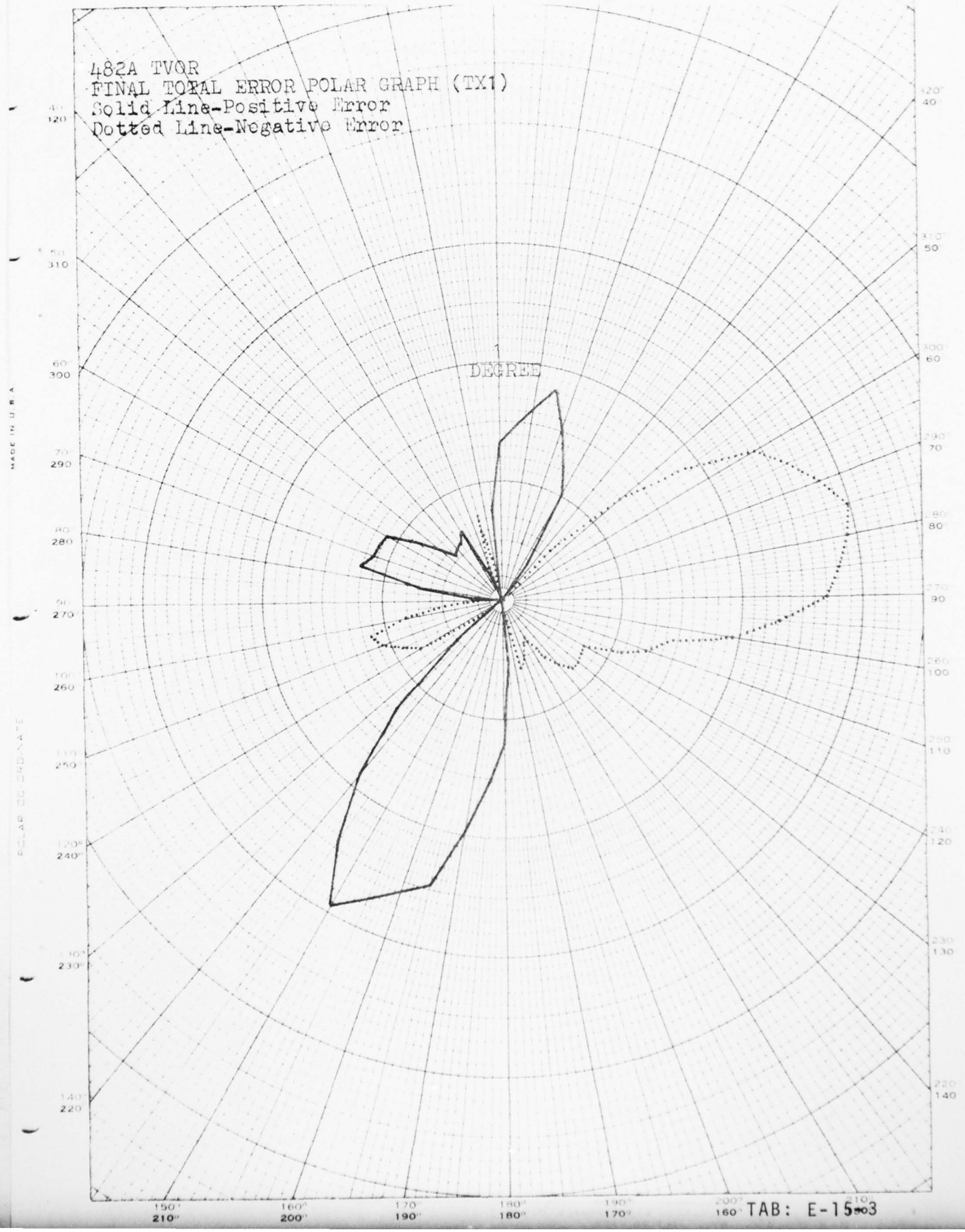
AFCS FORM MAY 71 243 REPLACES AFCSA FORM 8A, AUG 70, WHICH MAY BE USED.

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

TAB: E-14


482A TVOR
FINAL ANTENNA ERROR POLAR GRAPH (TX1)
Solid Line-Positive Error
Dotted Line-Negative Error
1
DEGREE


482A TVOR
FINAL GONIOMETER ERROR POLAR GRAPH (TX1)
Solid Line-Positive Error
Dotted Line-Negative Error
.25 DEGREES
.50 DEGREES
MADE IN U.S.A.
POLAR RECORD PAPER


482A TVOR
FINAL TOTAL ERROR POLAR GRAPH (TX1)
Solid Line-Positive Error
Dotted Line-Negative Error
1 DEGREE
MADE IN U.S.A.
POLAR COORDINATE
TAB: E-15-3

VOR/TVOR GROUND CHECK DATA

UNIT: 2046 Communications Group

DATE: Mar 77

OBSERVERS (Grade and Name)

MSgt D. Ferguson
MSgt J. Ramsey

EQUIPMENT NUMBER: 2 FINAL

A	RUN 1				RUN 2				F
FIELD DETECTOR AZIMUTH	B MONITOR COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	B COARSE SELECTOR DIAL READING	C MONITOR CALIBRATION FACTOR	D MONITOR TRUE COURSE B-C=D	E AZIMUTH ERROR A-D=E	AVERAGE ERROR $\frac{E+E}{2}$
0	0.42	0.2	0.22	-0.22	0.35	0.2	0.15	-0.15	-0.19
15	15.08	0.2	14.88	0.12	15.06	0.2	14.86	0.14	0.13
30	30.39	0.2	30.19	-0.19	30.22	0.2	30.02	-0.02	-0.11
45	45.90	0.1	45.80	-0.80	46.08	0.1	45.98	-0.98	-0.89
60	61.61	0.0	61.61	-1.61	61.40	0.0	61.40	-1.40	-1.51
75	76.68	-0.1	76.78	-1.78	76.60	-0.1	76.70	-1.70	-1.74
90	91.20	-0.1	91.30	-1.30	91.16	-0.1	91.26	-1.26	-1.28
105	105.64	-0.1	105.74	-0.74	105.70	-0.1	105.80	-0.80	-0.77
120	120.30	-0.1	120.40	-0.40	120.20	-0.1	120.30	-0.30	-0.35
135	135.50	0.0	135.50	-0.50	135.51	0.0	135.51	-0.51	-0.51
150	150.58	0.1	150.48	-0.48	150.88	0.1	150.78	-0.78	-0.63
165	165.75	0.1	165.65	-0.65	165.91	0.1	165.81	-0.81	-0.73
180	180.26	0.1	180.16	-0.16	180.20	0.1	180.10	-0.10	-0.13
195	194.82	0.1	194.72	0.28	194.81	0.1	194.71	0.29	0.29
210	209.65	0.1	209.55	0.45	209.81	0.1	209.71	0.29	0.37
225	225.78	0.1	225.68	-0.68	225.60	0.1	225.50	-0.50	-0.59
240	241.70	0.0	241.70	-1.70	241.68	0.0	241.68	-1.68	-1.69
255	256.88	-0.1	256.98	-1.98	256.81	-0.1	256.91	-1.91	-1.95
270	271.25	-0.2	271.45	-1.45	271.35	-0.2	271.55	-1.55	-1.50
285	285.47	-0.1	285.57	-0.57	285.42	-0.1	285.52	-0.52	-0.55
300	300.49	-0.1	300.59	-0.59	300.41	-0.1	300.51	-0.51	-0.55
315	315.80	0.0	315.80	-0.80	316.01	0.0	316.01	-1.01	-0.91
330	330.89	0.1	330.79	-0.79	330.80	0.1	330.70	-0.70	-0.75
345	346.31	0.1	346.21	-1.21	346.39	0.1	346.29	-1.29	-1.25

TYPED NAME AND GRADE OF SECTION SUPERVISOR

SIGNATURE

DATE: Mar 77

TX 2 FINAL

NOTE: In column for Check Points Azimuth.
0° to 180°
E = 180° +D

NOTE: For Check Points Azimuth
180° to 360°
E = 540° + D
*Record with opposite sign
**Change sign to neg
***Change sign of result

	FIRST RUN						SECOND RUN					
	A	B	C	D	E	F	B	C	D	E	F	G
	CHECK POINT AZIMUTH (Degrees)	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	MONITOR COURSE SELECTOR DIAL INDICATION	MONITOR CALIBRATION CURVE CORRECTION *	MONITOR TRUE COURSE B + C = D **	TRUE COURSE RECIPROCAL SEE NOTE FOR COMPUTATION ***	GROUND CHECK ERROR A+E=F	AVERAGE ERROR $\frac{F+F}{2}=G$
1	000	181.70	-0.2	-181.50	1.50	1.50	180.47	-0.2	-180.27	0.27	0.27	0.89
2	015	166.70	-0.2	-166.50	-13.50	1.50	166.72	-0.2	-166.52	-13.48	1.52	1.51
3	030	151.60	-0.2	-151.40	-28.60	1.40	151.49	-0.2	-151.29	-28.71	1.29	1.35
4	045	135.81	-0.1	-135.71	-44.29	0.71	135.86	-0.1	-135.76	-44.24	0.76	0.74
5	060	119.00	0.0	-119.00	-61.00	-1.00	119.77	0.0	-119.77	-60.23	-0.23	-0.62
6	075	104.72	0.1	-104.82	-75.18	-0.18	104.60	0.1	-104.70	-75.30	-0.30	-0.24
7	090	90.14	0.1	-90.24	-89.76	0.24	89.96	0.1	-90.06	-89.94	-0.06	0.09
8	105	75.60	0.1	-75.70	-104.30	0.70	75.52	0.1	-75.62	-104.38	0.62	0.66
9	120	60.90	0.1	-61.00	-119.00	1.00	60.92	0.1	-61.02	-118.98	1.02	1.01
10	135	45.90	0.0	-45.90	-134.10	0.90	45.80	0.0	-45.80	-134.20	0.80	0.85
11	150	30.88	-0.1	-30.78	-149.22	0.78	30.70	-0.1	-30.60	-149.40	0.60	0.69
12	165	15.54	-0.1	-15.44	-164.56	0.44	15.43	-0.1	-15.33	-164.67	0.33	0.39
13	180	0.14	-0.1	- 0.04	-179.96	0.04	1.10	-0.1	-1.00	-179.00	1.00	0.52
14	195	346.43	-0.1	-346.33	-193.67	1.33	346.26	-0.1	-346.16	-193.84	1.16	1.25
15	210	331.25	-0.1	-331.15	-208.85	1.15	331.20	-0.1	-331.10	-208.90	1.10	1.13
16	225	315.24	-0.1	-315.14	-224.86	0.14	315.21	-0.1	-315.11	-224.89	0.11	0.13
17	240	299.30	0.0	-299.30	-240.70	-0.70	299.31	0.0	-299.31	-240.69	-0.69	-0.70
18	255	284.00	0.1	-284.10	-255.90	-0.90	284.00	0.1	-284.10	-255.90	-0.90	-0.90
19	270	269.82	0.2	-270.02	-269.98	0.02	269.79	0.2	-269.99	-270.01	-0.01	0.01
20	285	255.55	0.1	-255.65	-284.35	0.65	255.63	0.1	-255.73	-284.27	0.73	0.69
21	300	240.79	0.1	-240.89	-299.11	0.89	240.78	0.1	-240.88	-299.12	0.88	0.89
22	315	225.80	0.0	-225.80	-314.20	0.80	225.72	0.0	-225.72	-314.28	0.72	0.76
23	330	210.86	-0.1	-210.76	-329.2	0.76	210.87	-0.1	-210.77	-329.23	0.77	0.77
24	345	195.46	-0.1	-195.36	-344.64	0.36	195.46	-0.1	-195.36	-344.64	0.36	0.36

AFCS FORM NOV 74 965

REVERSE GROUND CHECK DATA

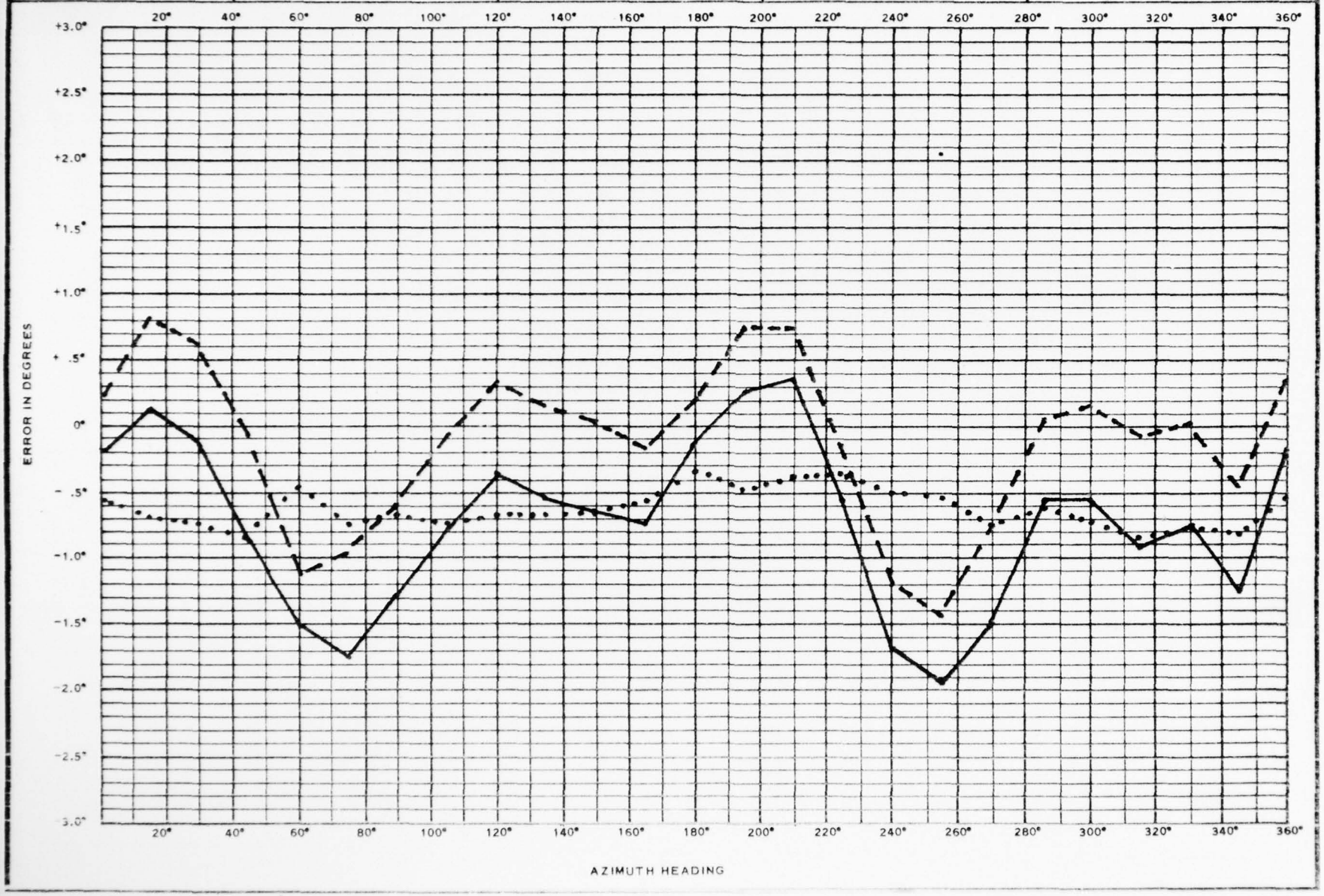
TAB: E-16-2

FINAL GROUND CHECKS TVOR TOTAL ERROR CURVE

DATE: Mar 77

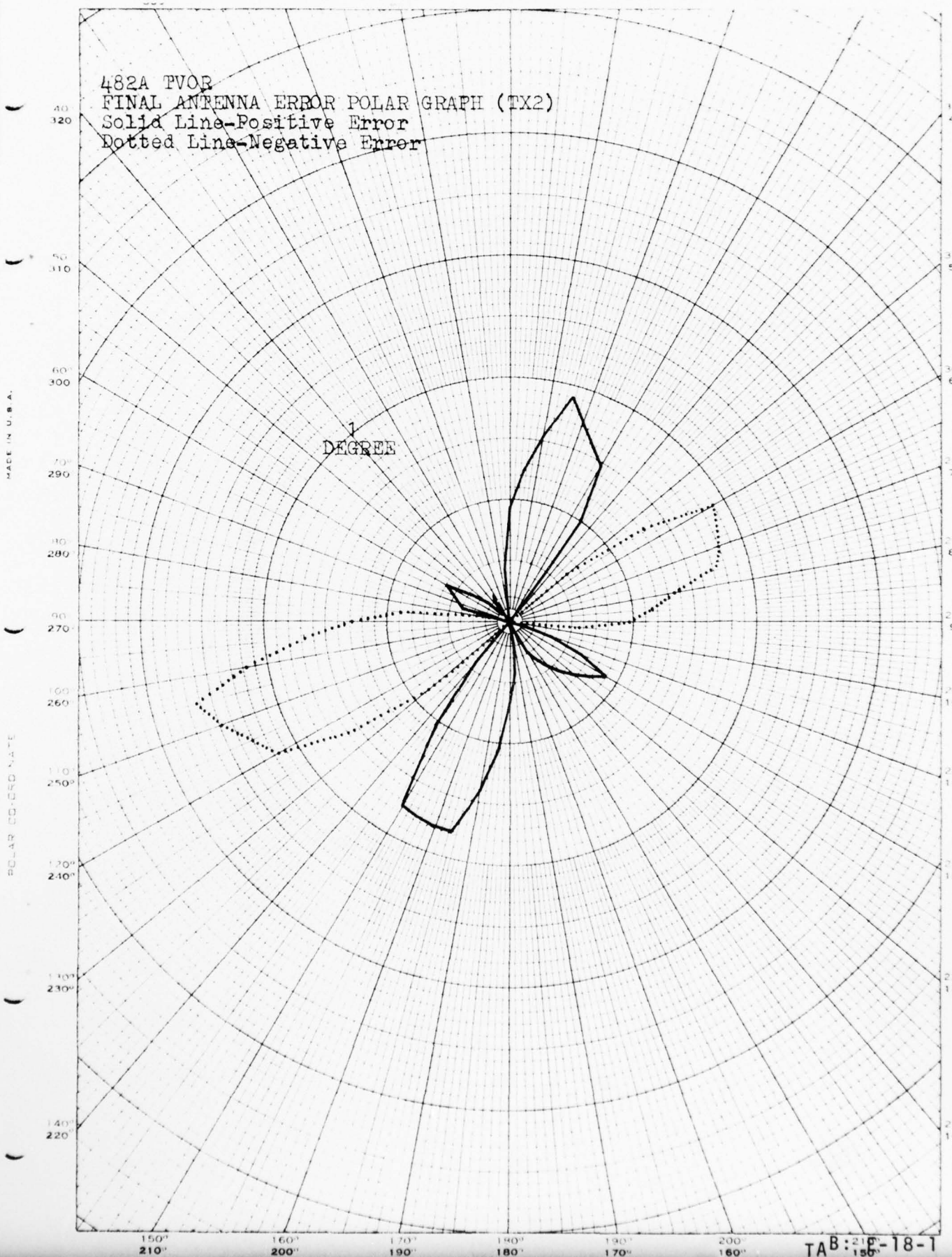
TRANSMITTER 2 | TOTAL ERROR ——— | ANTENNA ERROR------ | GONIOMETER ERROR...

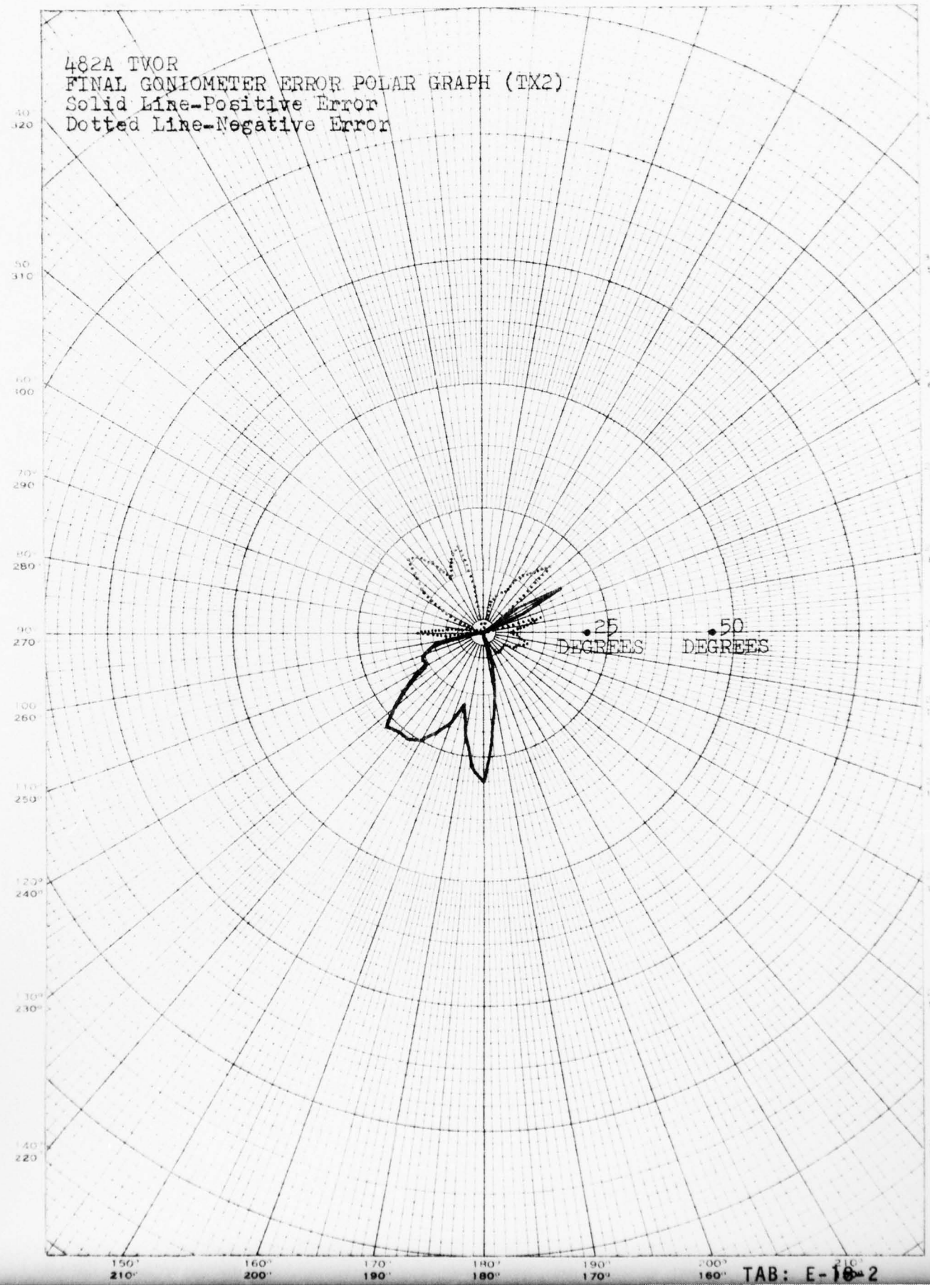
COMPUTED BY: MSgt Ferguson

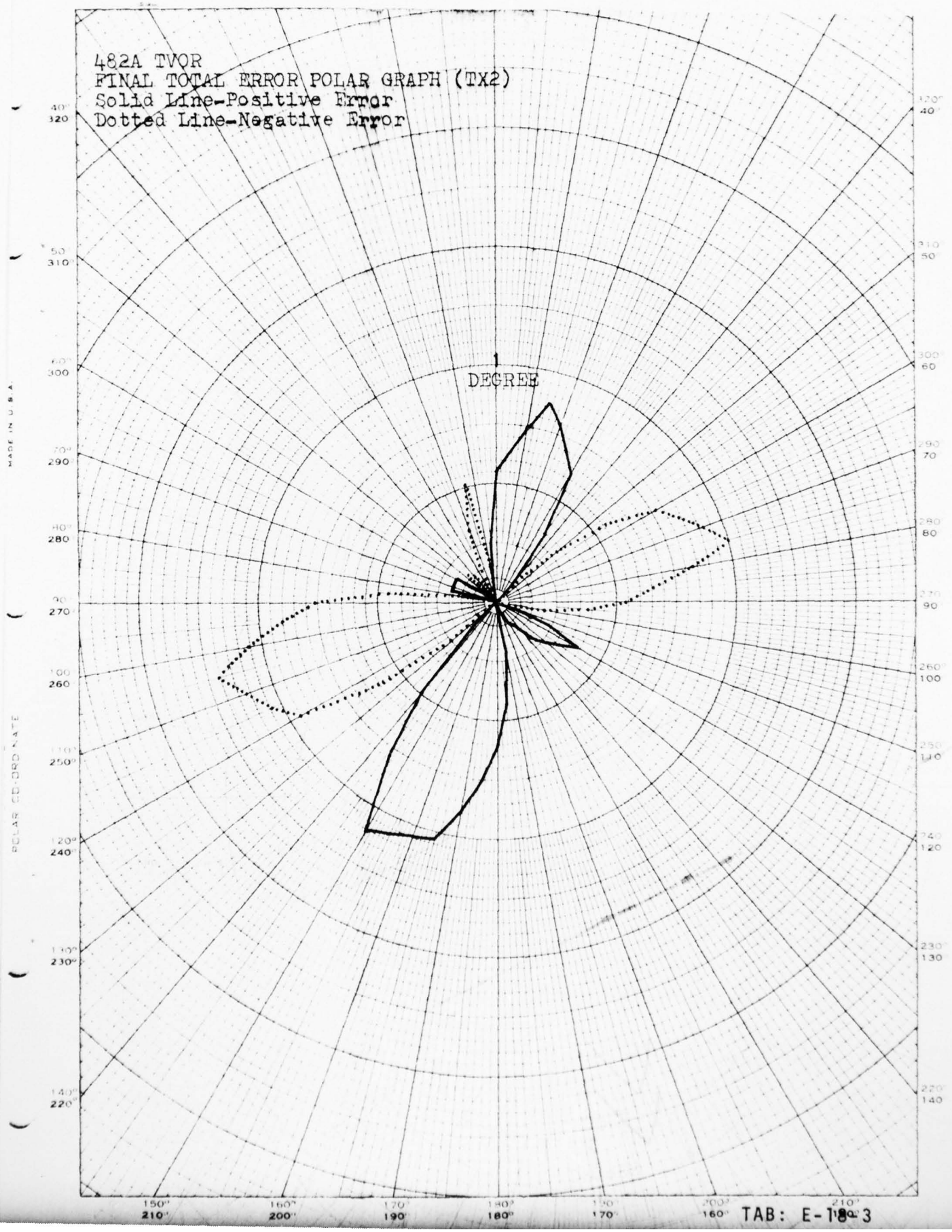


TAB: E-17

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

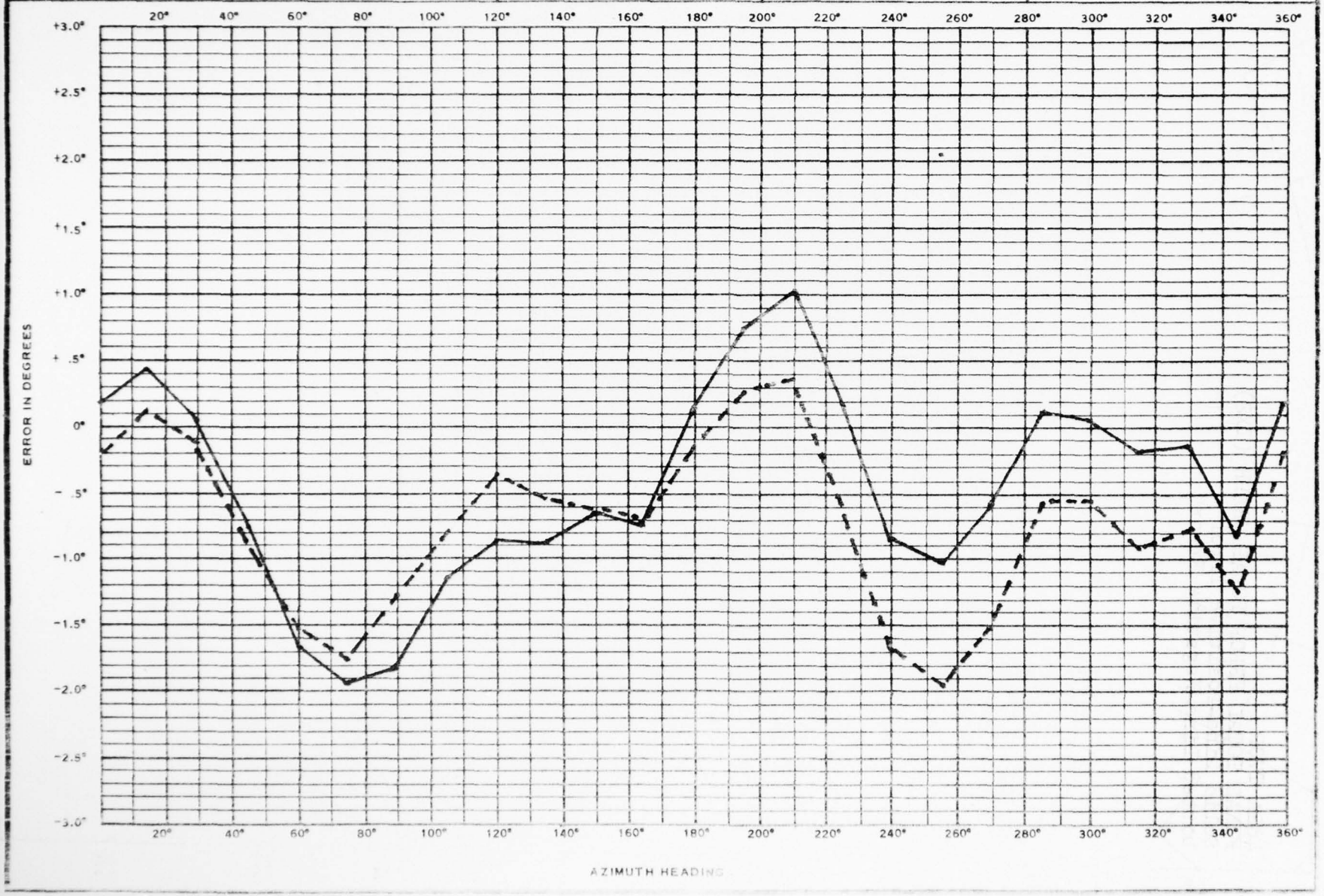

482A TVOR
FINAL ANTENNA ERROR POLAR GRAPH (TX2)
Solid Line-Positive Error
Dotted Line-Negative Error
1
DEGREE
MADE IN U.S.A.
POLAR COORDINATE


482A TVOR
FINAL GONIOMETER ERROR POLAR GRAPH (TX2)
Solid Line-Positive Error
Dotted Line-Negative Error
25 DEGREES
50 DEGREES
30 330
40 320
50 310
60 300
70 290
80 280
90 270
100 260
110 250
120 240
130 230
140 220
150 210
160 200
170 190
180
190 170
200 160
210


482A TVOR
FINAL TOTAL ERROR POLAR GRAPH (TX2)
Solid Line-Positive Error
Dotted Line-Negative Error
1
DEGREE
MADE IN U.S.A.
POLAR COORDINATE

FINAL GROUND CHECKS — VOR/TVOR GROUND ERROR CURVE

DATE	ERROR SPREAD	EQUIPMENT NR 1	EQUIPMENT NR 2	TRANSMITTER DIFFERENTIAL	COMPUTED BY
Mar 77		2.96°	2.32°	0.94°	MSgt Ferguson



TAB: E-19

☆U. S. GOVERNMENT PRINTING OFFICE: 1973--768061/504 REGION NO. 6

FLIGHT INSPECTION REPORT — VOR, VORTAC, TACAN, VOT

Reports Identification Symbol: FS 8071-16

1. STATION	2. LOCATION IDENT	3. DATE/DATES OF INSPECTION
Wright Patterson AFB OH 45433	FFO	17/19-21 Mar 77

4. TYPE OF INSPECTION

	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS		YES
	COMMISSIONING		SURVEILLANCE		INCOMPLETE	X	NO

5. COMMON SYSTEM

6. OWNER

	FAA		U S ARMY
			U S NAVY
	INTER-NATIONAL	X	U S A F
			U S C G

PRIVATE (Indicate actual owner)

OTHER (Indicate actual owner)

7. FACILITY / COMPONENT INSPECTED

	VOR	X	VORTAC		TACAN		VOT		DME

8. RADIAL DATA

FACILITY SERVICE DESIGNATION	TAC	VOR	TAC	VOR	TAC	VOR	TAC	VOR	TAC	VOR
RADIAL USE	REF	REF	REF	REF	APCH	APCH	MAPCH	MAPCH	APCH	APCH
AZIMUTH	098	098	098	098	047	047	230	230	047	047
TRANSMITTER(S)	1	1	2	2	1	1	1	1	2	2
MSL ALTITUDE (In hundreds)	23	23	23	23	38/12	38/12	17/29	17/29	30/12	30/12
DISTANCE (Nautical miles) FROM	13.5	13.5	13	13	15	15	2	2	15	15
DISTANCE (Nautical miles) TO	17	17	18	18	2.1	2.1	10	10	2.1	2.1
SENSITIVITY		S		S		S		S		S
ROUGHNESS	.6/16	.5/13.6	2.5/17.7	1.1/14	1.5/6	.9/7	.4/10	.8/10	1.5/9	.7/3.0
SCALLOPING	0	1.7/14.3	0	2/14.8	0	0	0	0	0	1.6/10.0
BENDS	0	0	0	0	0	0	0	0	0	0
POLORIZATION	0	1.4/16	0	2.0/17.1						
ALIGNMENT ERROR	+.5/15.5	+.5/15.5	+.5/15.5	-1.2/15.5	+.5/3.5	+1.5/2.3			-1/3.0	+1.4/2.1
TRANSMITTER DIFFERENCE	0	.7	0	.7	1.5	0.1			1.5	0.1
SIGNAL STRENGTH	S	90	S	40	S	660	S	800	S	650
INTERFERENCE	0	0	0	0	0	0	0	0	0	0

9. GENERAL	SAT	UNSAT.
STANDBY POWER		
VOICE	X	
IDENTIFICATION	X	
DME ACCURACY	X	
DME COVERAGE	X	

10. MONITORS

LAST DATE INSPECTED		TX	ALIGNMENT	ALARM +	ALARM −
VOR 25 Jul 75	REFERENCE RADIAL 098	1	+.9	1.9	.1
	CHECK POINT 098.5/15.5	2	+.9	1.9	.1
TACAN 28 May 75	REFERENCE RADIAL 098	1	-.5	.3	1.1
	CHECK POINT 098.5/15.5	2	-.5	.3	1.1

11. DISCREPANCIES AND/OR REMARKS

1. This was a special inspection for TRACALS evaluation.
2. VOR antenna retuned prior to inspection.
3. VOR remote change over inoperative. TACAN remote change over satisfactory
4. All holding patterns and DME arcs flown satisfactory.
5. VORTAC GCP 040/1.6, VOR out of tolerance (alignment). Also, there were two GCP circles drawn. Both were utilizing the same GCP data, but were approximately 150' apart laterally. I recommended to the Chief of Airfield management that the GCP data sign be changed to the 037 radial for the VOR check;

CORRECTED: YES | NO

FACILITY CLASSIFICATION	
	UNRESTRICTED
X	RESTRICTED
	UNUSEABLE

FLIGHT INSPECTOR'S SIGNATURE: Alan L Rust

62

ALAN L. RUST, Capt, USAF

REGION

FIELD OFFICE: 1866 FCS

FAA FORM 3485 (8-64) REPLACES FAA FORM 3158 WHICH IS OBSOLETE

FLIGHT INSPECTION REPORT — VOR, VORTAC, TACAN, VOT

Reports Identification Symbol FS 8071-16

1. STATION	2. LOCATION IDENT	3. DATE/DATES OF INSPECTION
Wright Patterson AFB OH 45433	FFO	17/19-21 Mar 77

4. TYPE OF INSPECTION

	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS		YES
	COMMISSIONING		SURVEILLANCE		INCOMPLETE	X	NO

5. COMMON SYSTEM

6. OWNER

	FAA		U S ARMY
			U S NAVY
	INTER-NATIONAL	X	U S A F
			U S C G

PRIVATE (Indicate actual owner)

OTHER (Indicate actual owner)

7. FACILITY/COMPONENT INSPECTED

	VOR		VORTAC		TACAN		VOT		DME
		X							

8. RADIAL DATA

FACILITY SERVICE DESIGNATION	TAC	VOR	TAC	VOR	TAC	VOR	TAC	VOR	TAC	VOR
RADIAL USE	MAPCH	MAPCH	APCH	APCH	MAPCH	MAPCH	APCH	APCH	MAPCH	MAPCH
AZIMUTH	230	230	239	239	050	050	239	239	050	050
TRANSMITTER(S)	2	2	2	2	2	2	1	1	1	1
MSL ALTITUDE (In hundreds)	20/30	20/30	40/12	40/12	20/29	20/29	30/126	30/12.6	12/30	12/30
DISTANCE (Nautical miles) FROM	1	1	15	15	3	3	15	15	1	1
DISTANCE (Nautical miles) TO	10	10	1	1	10	10	1	1	10	10
SENSITIVITY		S		S		S		S		S
ROUGHNESS	.3/6	1/10	.7/2.0	.7/5.7	.3/9.0	1.5/8	.7/2.8	1.2/1.2	.5/9.2	.5/7
SCALLOPING	0	0	0	0	0	2.4/10	0	1.0/8	0	3/12.5
BENDS	0	0	0	0	0	0	0	0	0	0
POLORIZATION										
ALIGNMENT ERROR			-.8/14	-1.2/1			-.5/1.0	+.6/4.8		
TRANSMITTER DIFFERENCE										
SIGNAL STRENGTH	S	900	S	720	S	820	S	1000+	S	93
INTERFERENCE	0	0	0	0	0	0	0	0	0	0

9. GENERAL	SAT	UNSAT
STANDBY POWER		
VOICE		
IDENTIFICATION		
DME ACCURACY		
DME COVERAGE		

10. MONITORS

LAST DATE INSPECTED		TX	ALIGNMENT	ALARM +	ALARM −
VOR	REFERENCE RADIAL				
	CHECK POINT				
TACAN	REFERENCE RADIAL				
	CHECK POINT				

11. DISCREPANCIES AND/OR REMARKS

that the GCP between the runway hold line and the IFR hold line be deleted.

6. VORTAC GCP 048/1.4, VOR out of tolerance (alignment). I recommended to the Chief of Airfield Management that the GCP data sign be changed to the 047 radial for VOR and TACAN.

7. Previous VOR restriction remains in effect.

8. This inspection meets periodic requirements; Mr. Roesel, FINFO, notified 20 Mar 77.

CORRECTED	
YES	NO

FACILITY CLASSIFICATION	FLIGHT INSPECTOR'S SIGNATURE	REGION
UNRESTRICTED		
RESTRICTED		FIELD OFFICE
UNUSEABLE		

FLIGHT INSPECTION REPORT VOR, VORTAC, TACAN, VOT

Reports Validation Symbol
FS 8071-16

1. STATION	2. LOCATION IDENT.	3. DATE/DATES OF INSPECTION
Wright Patterson AFB OH 45433	FFO	17/19-21 Mar 77

4. TYPE OF INSPECTION						5. COMMON SYSTEM	
	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS		YES
	COMMISSIONING		SURVEILLANCE		INCOMPLETE	X	NO

6. OWNER				
	FAA		U S ARMY	PRIVATE (Indicate actual owner)
			U S NAVY	
	INTER-NATIONAL		U S A F	OTHER (Indicate actual owner)
			U S C G	

7. FACILITY/COMPONENT INSPECTED		VOR	X	VORTAC		TACAN		VOT		DME

8. RADIAL DATA

FACILITY SERVICE DESIGNATION		TAC	VOR	TAC	VOR	TAC	VOR	TAC	VOR	TAC	VOR
RADIAL USE		GCP	GCP	GCP	GCP	GCP	GCP	GCP	GCP	GCP	GCP
AZIMUTH		048	048	048	048	258	258	258	258	040	040
TRANSMITTER(S)		1	1	2	2	2	2	1	1	1	1
MSL ALTITUDE (In hundreds)		8	8	8	8	8	8	8	8	8	8
DISTANCE (Nautical miles)	FROM	1.4	1.4	1.4	1.4	0.5	0.5	0.5	0.5	1.6	1.6
	TO										
SENSITIVITY			S		S		S		S		S
ROUGHNESS		0	0.1/1.4	0.2/1.4	0.1/1.4	0.2/0.5	0	0	0.2/0.5	0.7/1.6	0.2/1.6
SCALLOPING		0	0	0	0	0	0	0	0	0	0
BENDS		0	0	0	0	0	0	0	0	0	0
POLORIZATION											
ALIGNMENT ERROR		+.4/1.4	+2.2/1.4	+.4/1.4	+2.2/1.4	-1.0/0.5	+1.2/.5	-1.5/.5	+1.0/.5	-1.1/1.6	+2.5/1.6
TRANSMITTER DIFFERENCE		0	0	0	0	0.5	0.2	0.5	0.2	0.1	0.4
SIGNAL STRENGTH		S	550	S	640	S	1000+	S	1000+	S	300
INTERFERENCE		0	0	0	0	0	0	0	0	0	0

9. GENERAL	SAT	UNSAT
STANDBY POWER		
VOICE		
IDENTIFICATION		
DME ACCURACY		
DME COVERAGE		

10. MONITORS

LAST DATE INSPECTED		TX	ALIGNMENT	ALARM +	ALARM −
VOR	REFERENCE RADIAL				
	CHECK POINT				
TACAN	REFERENCE RADIAL				
	CHECK POINT				

11. DISCREPANCIES AND/OR REMARKS

CORRECTED	
YES	NO

FACILITY CLASSIFICATION	FLIGHT INSPECTOR'S SIGNATURE	REGION
UNRESTRICTED		
RESTRICTED		FIELD OFFICE
UNUSEABLE		

FLIGHT INSPECTION REPORT — VOR, VORTAC, TACAN, VOT

Reports Identification Symbol
FS 8071-16

1. STATION	2. LOCATION IDENT.	3. DATE/DATES OF INSPECTION
Wright Patterson AFB OH 45433	FFO	17/19-21 Mar 77

4. TYPE OF INSPECTION

						5. COMMON SYSTEM	
	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS		YES
	COMMISSIONING		SURVEILLANCE		INCOMPLETE	X	NO

6. OWNER

	FAA		U S ARMY	PRIVATE (Indicate actual owner)
			U S NAVY	
	INTER-NATIONAL	X	U S A F	OTHER (Indicate actual owner)
			U S C G	

7. FACILITY/COMPONENT INSPECTED

	VOR		VORTAC		TACAN		VOT		DME
		X							

8. RADIAL DATA

FACILITY SERVICE DESIGNATION		TAC	VOR								
RADIAL USE		GCP	GCP								
AZIMUTH		040	040								
TRANSMITTERS		2	2								
MSL ALTITUDE (In hundreds)		8	8								
DISTANCE (Nautical miles)	FROM	1.6	1.6								
	TO										
SENSITIVITY			S								
ROUGHNESS		.7/1.6	.5/1.6								
SCALLOPING		0	0								
BENDS		0	0								
POLORIZATION											
ALIGNMENT ERROR		-1.0/1.6	+2.9/1.6								
TRANSMITTER DIFFERENCE		0.1	0.4								
SIGNAL STRENGTH		S	300								
INTERFERENCE		0	0								

9. GENERAL	SAT	UNSAT
STANDBY POWER		
VOICE		
IDENTIFICATION		
DME ACCURACY		
DME COVERAGE		

10. MONITORS

LAST DATE INSPECTED		TX	ALIGNMENT	ALARM +	ALARM −
VOR	REFERENCE RADIAL				
	CHECK POINT				
TACAN	REFERENCE RADIAL				
	CHECK POINT				

11. DISCREPANCIES AND/OR REMARKS

FACILITY CLASSIFICATION	FLIGHT INSPECTOR'S SIGNATURE
UNRESTRICTED	
RESTRICTED	
UNUSEABLE	

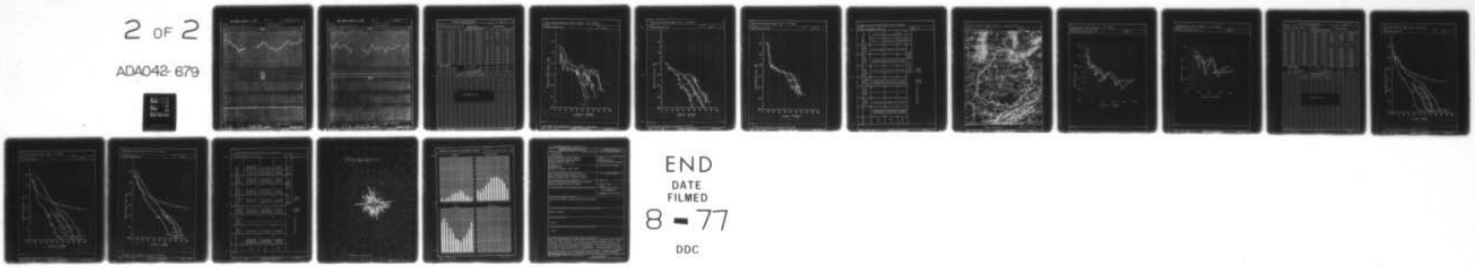
FAA FORM 3485 (2-84) REPLACES FAA FORM 3195 WHICH IS OBSOLETE

AD-A042 679 FACILITY CHECKING SQUADRON (1866TH) (AFCS) RICHARDS-G--ETC F/G 17/7
TRACALS EVALUATION REPORT. VORTAC STATION EVALUATION REPORT4 WR--ETC(U)
MAR 77 G S HOWARD

UNCLASSIFIED 77/66N-89 NL

2 OF 2

ADA042 679

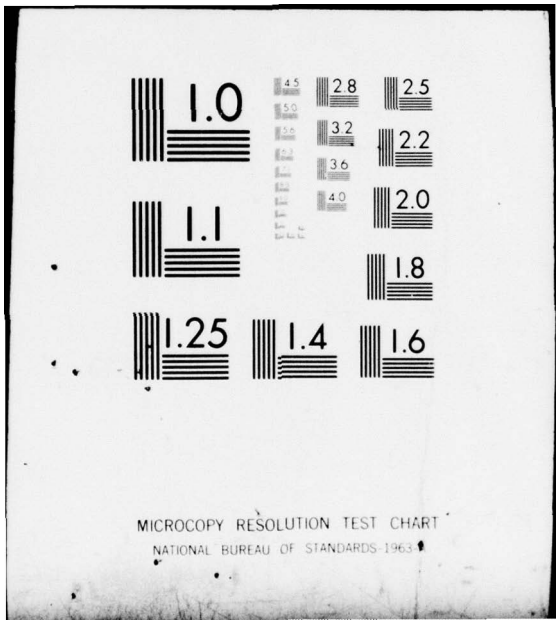


END

DATE FILMED

8 - 77

DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

VOR, VORTAC, TACAN OR [illegible]AL PLOT

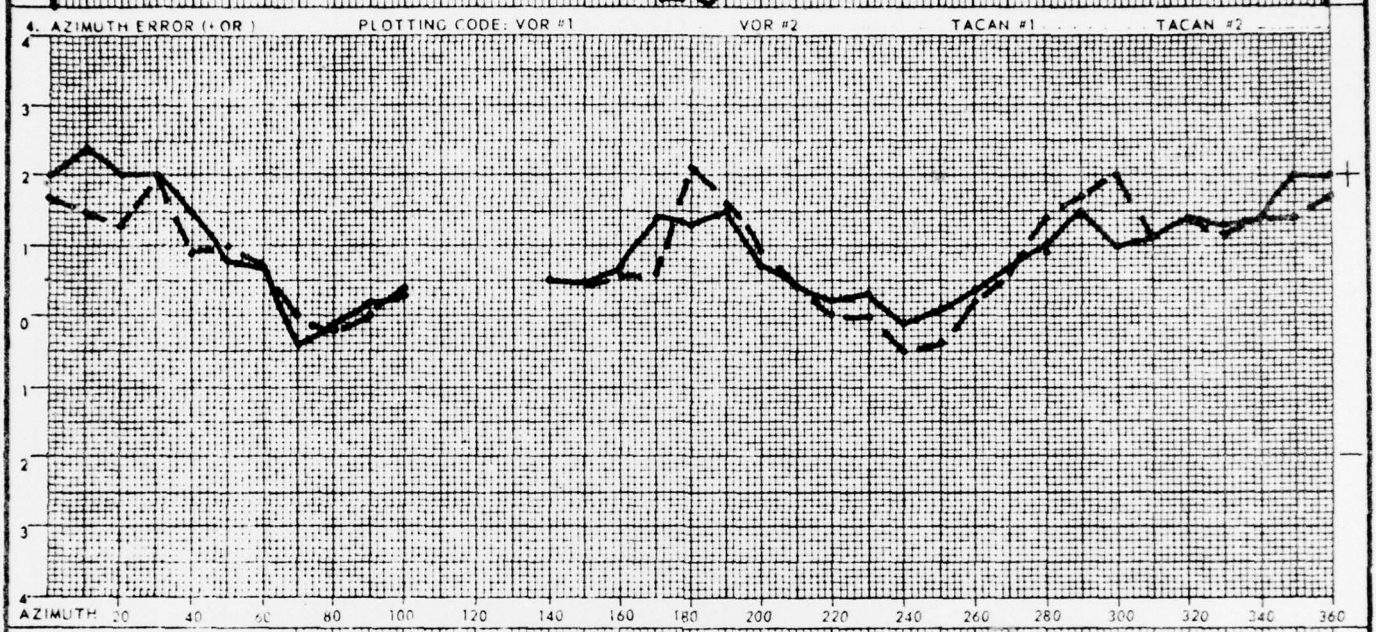
VOR
TACAN
DME

Reports Identification Symbol
FS 8071 -13

1. STATION
Wright Patterson AFB OH 45433

2. DATE DATES OF INSPECTION
17/19-21 Mar 77

3. ALTITUDE 23

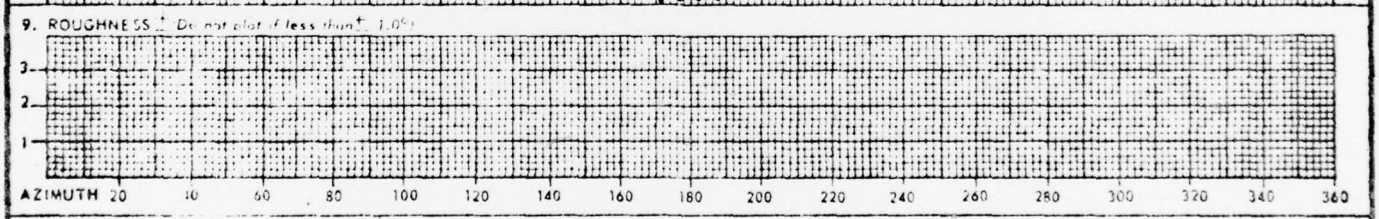


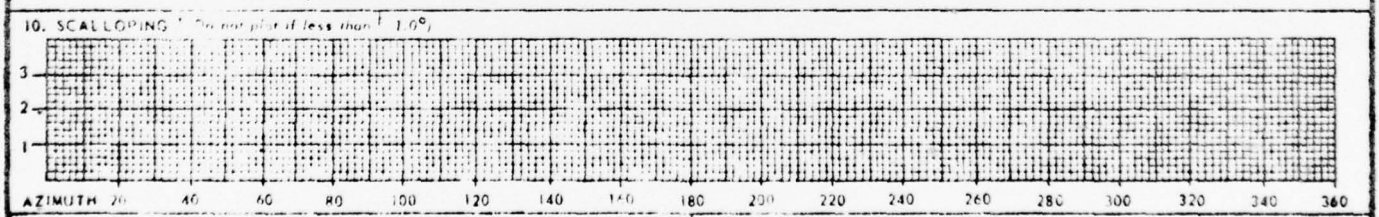
5. CHECK POINT LOCATION

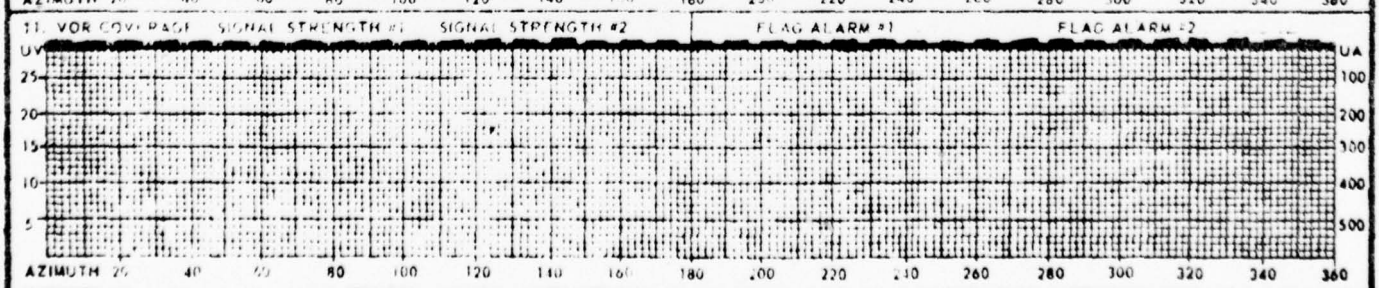
6. TACAN DISTANCE LOCK ON NA

7. TACAN AZIMUTH LOCK ON NA

8. AREA OF INTERFERENCE NA







12. ORBITAL	EQUIPMENT		SPREAD	13. ORBIT RADIUS
ERROR	X	TP NO. 1	-.4 +2.4	2.8	6NM
SPREAD	X	TP NO. 2	-.5 +2.1	2.6	

REVIEWING OFFICIAL'S SIGNATURE

REGION

FIELD OFFICE 1866FCS

FAA Form 8405-2 (2-44) REPLACES FORM FAA 16/8 AND FAA FORM 3196 WHICH IS OBSOLETE

C FAA AC 74-4395 (8071 - 6040)

VOR, VORTAC, TACAN OF[illegible]AL PLOT

X TACAN ( ) DME

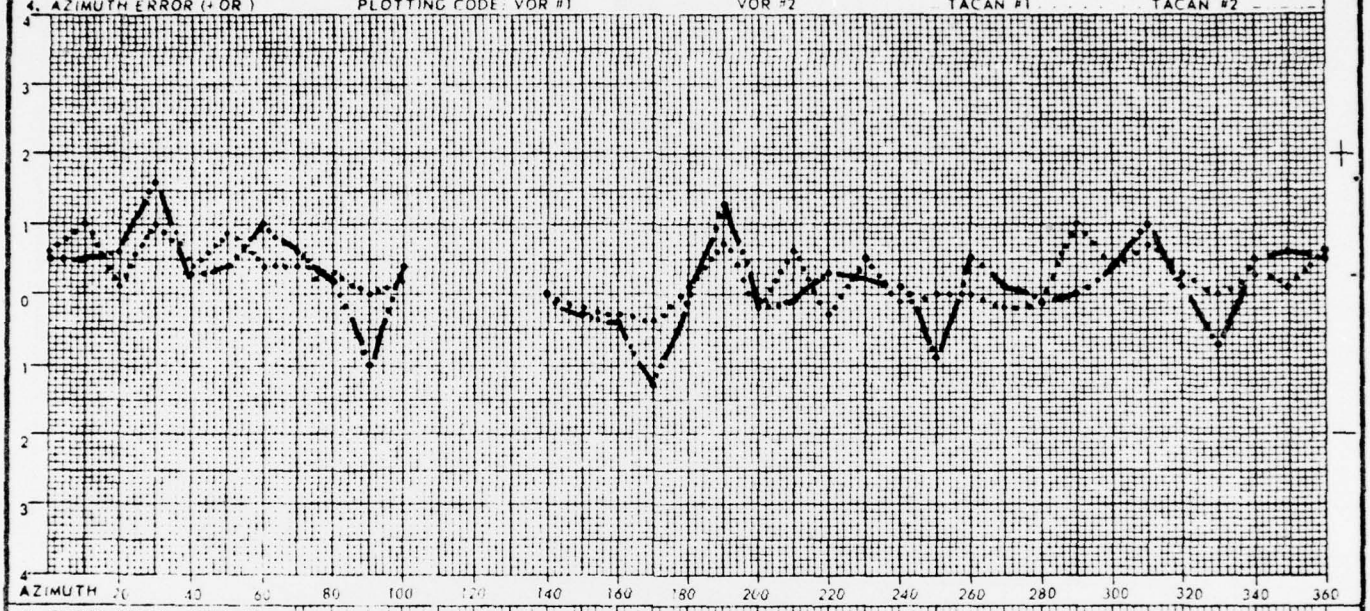
Reports Identification Symbol
FS 8071 -13

1. STATION
Wright Patterson AFB OH 45433

2. DATE DATES OF INSPECTION
17/19-21 Mar 77

3. ALTITUDE 23

4. AZIMUTH ERROR (+ OR -) PLOTTING CODE: VOR #1 VOR #2 TACAN #1 TACAN #2



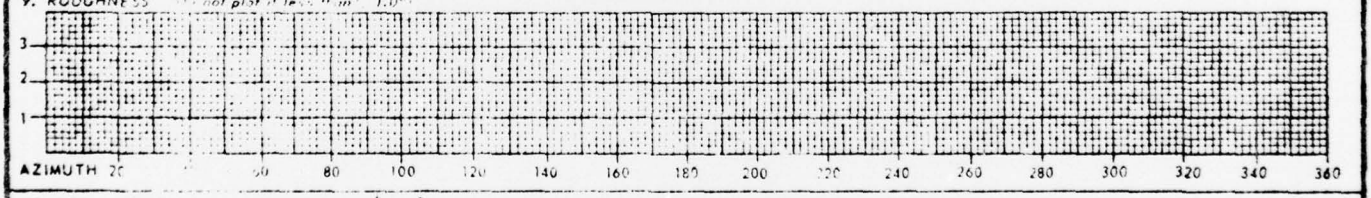
5. CHECK POINT LOCATION

6. TACAN DISTANCE LOCK ON

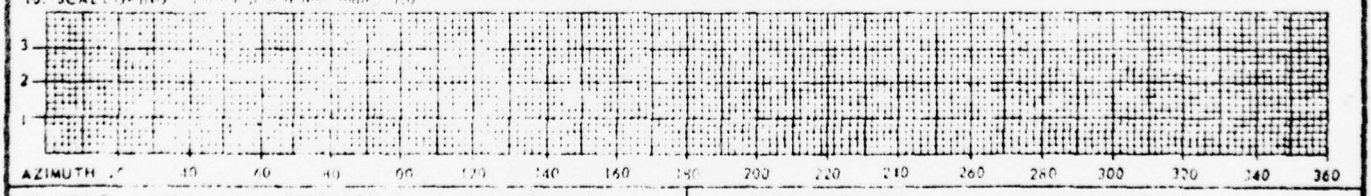
7. TACAN AZIMUTH LOCK ON

8. AREA OF INTERFERENCE NA

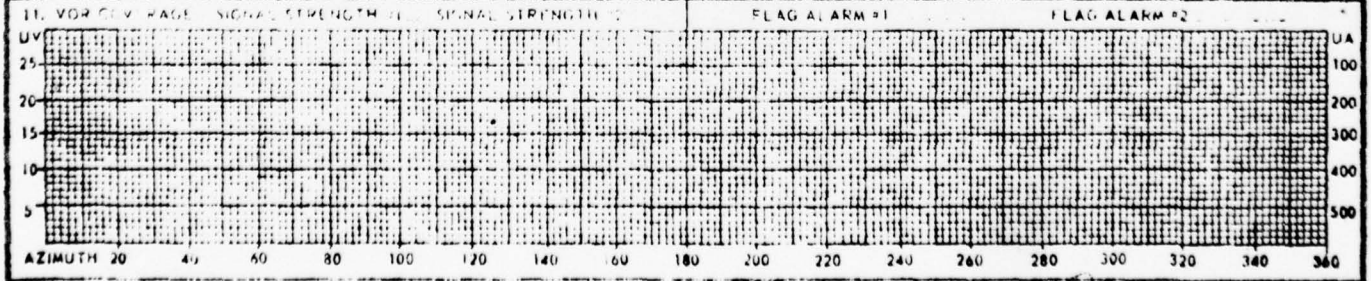
9. ROUGHNESS [illegible] 1.0°



10. SCALLOPING [illegible] 1.0°



11. VOR CDI FAGC SIGNAL STRENGTH TX SIGNAL STRENGTH RX FLAG ALARM #1 FLAG ALARM #2



12. ORBITA ERROR SPREAD	EQUIPMENT			SPREAD	13. ORBIT RADIUS	REVIEWING OFFICIAL'S SIGNATURE
	TX X TP NO. 1	-.4	+1.0	1.4	6NM	REGION
	TX X TP NO. 2	-1.3	+1.6	2.9		FIELD OFFICE 1866 FCS

FAA Form 2485-2 (2-64) REPLACES FORM FAA 161F AND FAA FORM 3196 WHICH IS OBSOLETE C FAA AC 74-8305 (8071 - 6040)

TACAN FLIGHT DATA SUMMARY

DATE: Mar 77

LOCATION	EQUIPMENT	UNIT
Wright-Patterson AFB, OH	AN/GRN-20C	2046 Comm Gp

ORBITAL ALIGNMENT ERROR

AZ	TX 1	TX 2	DIFFERENTIAL	AZ	TX 1	TX 2	DIFFERENTIAL
360	.6	.5	.1	180	.1	.1	0
350	.1	.6	-.5	170	-.4	-1.3	.9
340	.3	.5	-.2	160	-.3	-.4	.1
330	0	-.7	.7	150	-.2	-.3	.1
320	.3	.1	.2	140	0	0	0
310	.7	1.0	-.3	130			
300	.4	.4	0	120			
290	1.0	0	1.0	110			
280	-.1	-.1	0	100	.2	.4	-.2
270	-.2	.1	-.3	90	0	-1.0	1.0
260	0	.1	-.5	80	.3	.2	.1
250	0	.5	.9	70	.4	.6	.2
240	-.1	-.9	-.2	60	.4	1.0	-.6
230	.5	.1	0	50	.9	.4	.5
220	-.3	.5	-.6	40	.4	.3	.1
210	.6	.3	.7	30	1.0	1.6	-.6
200	-.2	-.1	-.1	20	.1	.6	-.5
190	.7	-1.3	-.6	10	1.0	.5	.5
ERROR SPREAD TX 1: -0.4 TO +1.0 TX 2: -1.3 TO +1.6			AVERAGE		.25	.20	.06
			CONF LIMITS 99%		±.02	±.29	±.23

RADIAL FLIGHT DATA

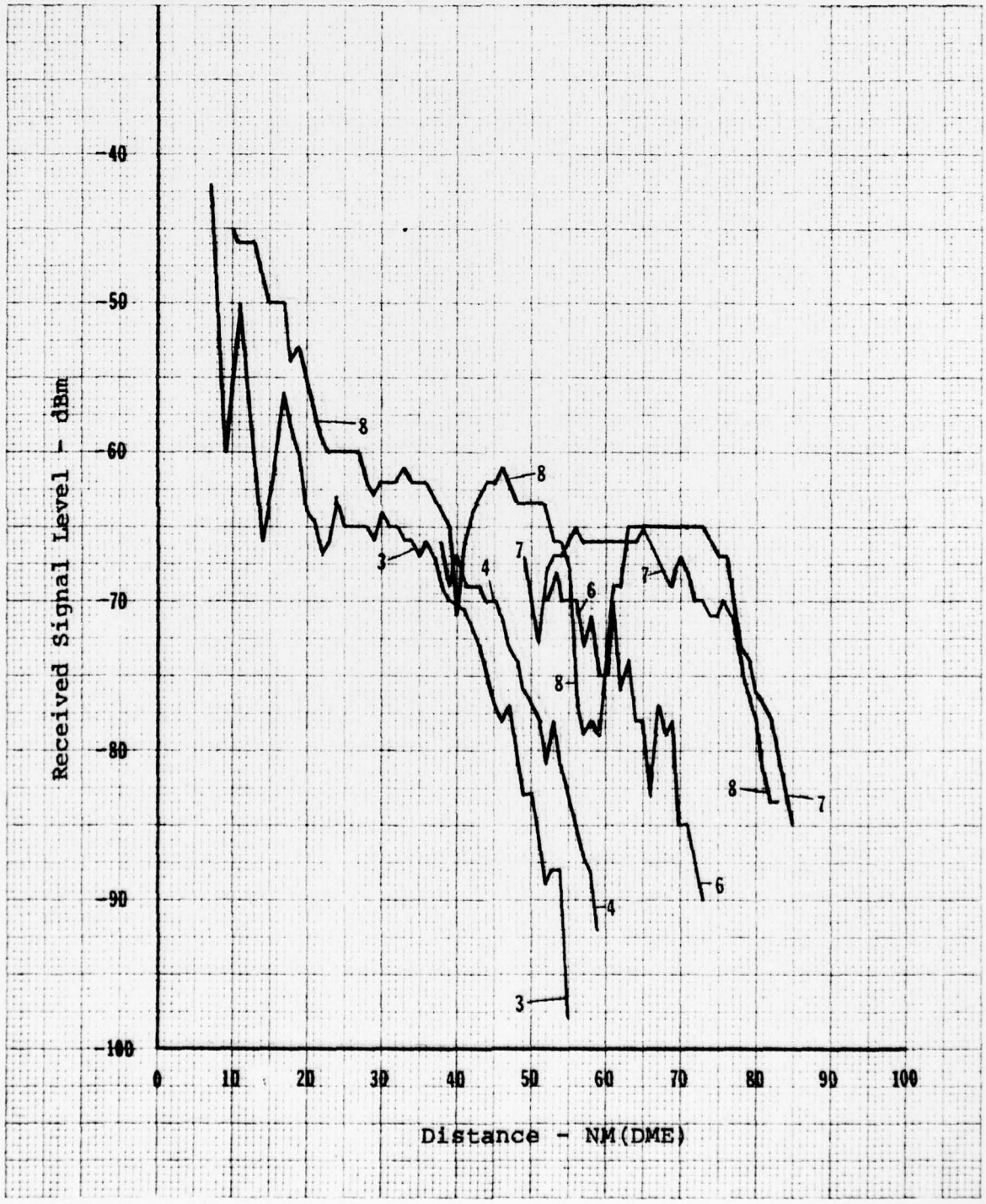
RADIAL	USE	TX NO	ALT	DISTANCE		ALIGN ERROR		ROUGH		TX DIF	BENDS	SCLP	POLAR	SIG STR
				FROM	TO	AVE	MAX	AVE	MAX					

See TABs F-3-1/3

TITLE

TACAN ACTUAL RECEIVED SIGNAL LEVELS - 035° RADIAL

LOCATION	DATE
Wright-Patterson, OH	Mar 77



REMARKS

Altitudes are expressed in thousands of feet MSL.

TITLE

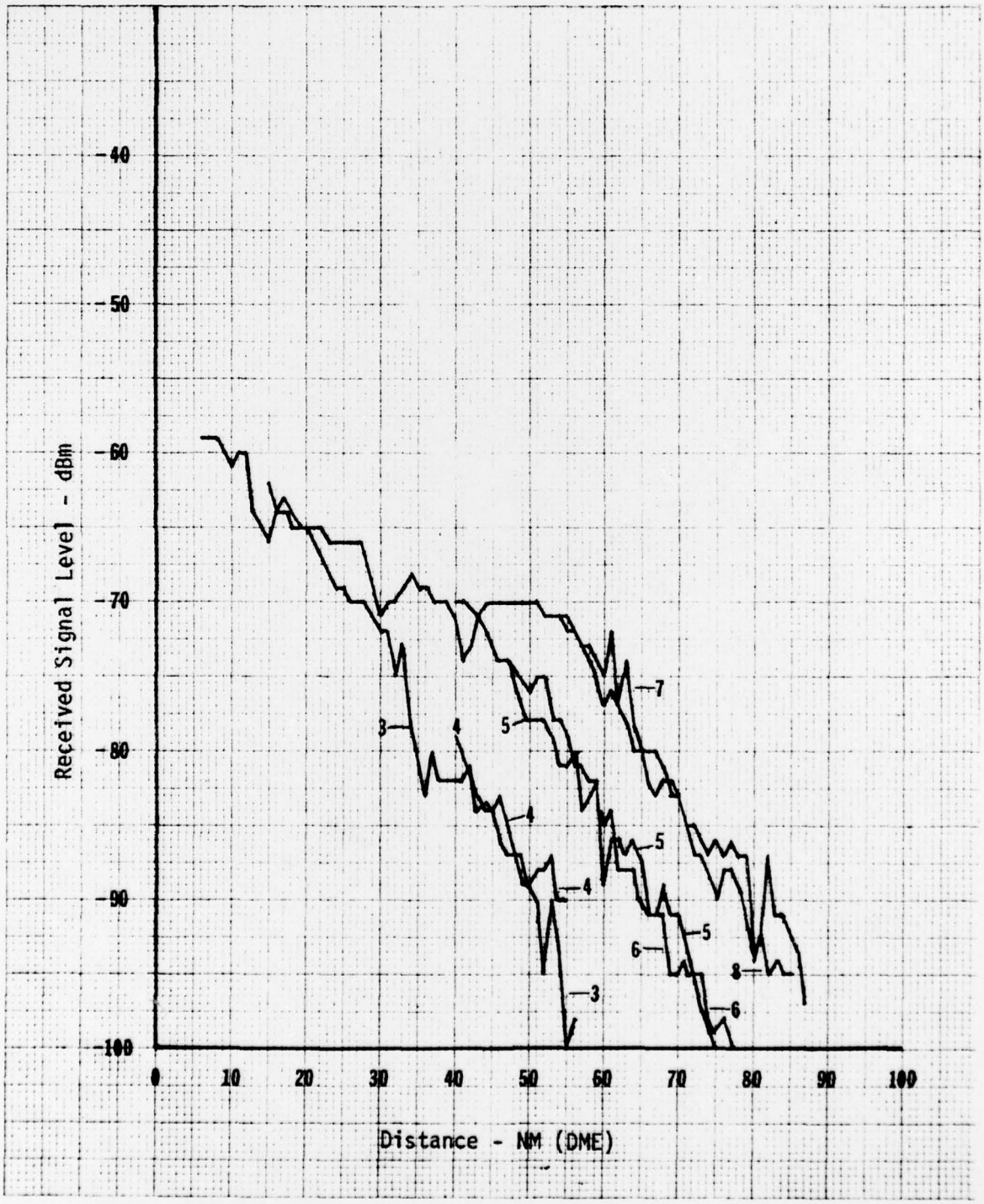
TACAN ACTUAL RECEIVED SIGNAL LEVELS - 155° RADIAL

LOCATION

Wright-Patterson, OH

DATE

Mar 77



REMARKS

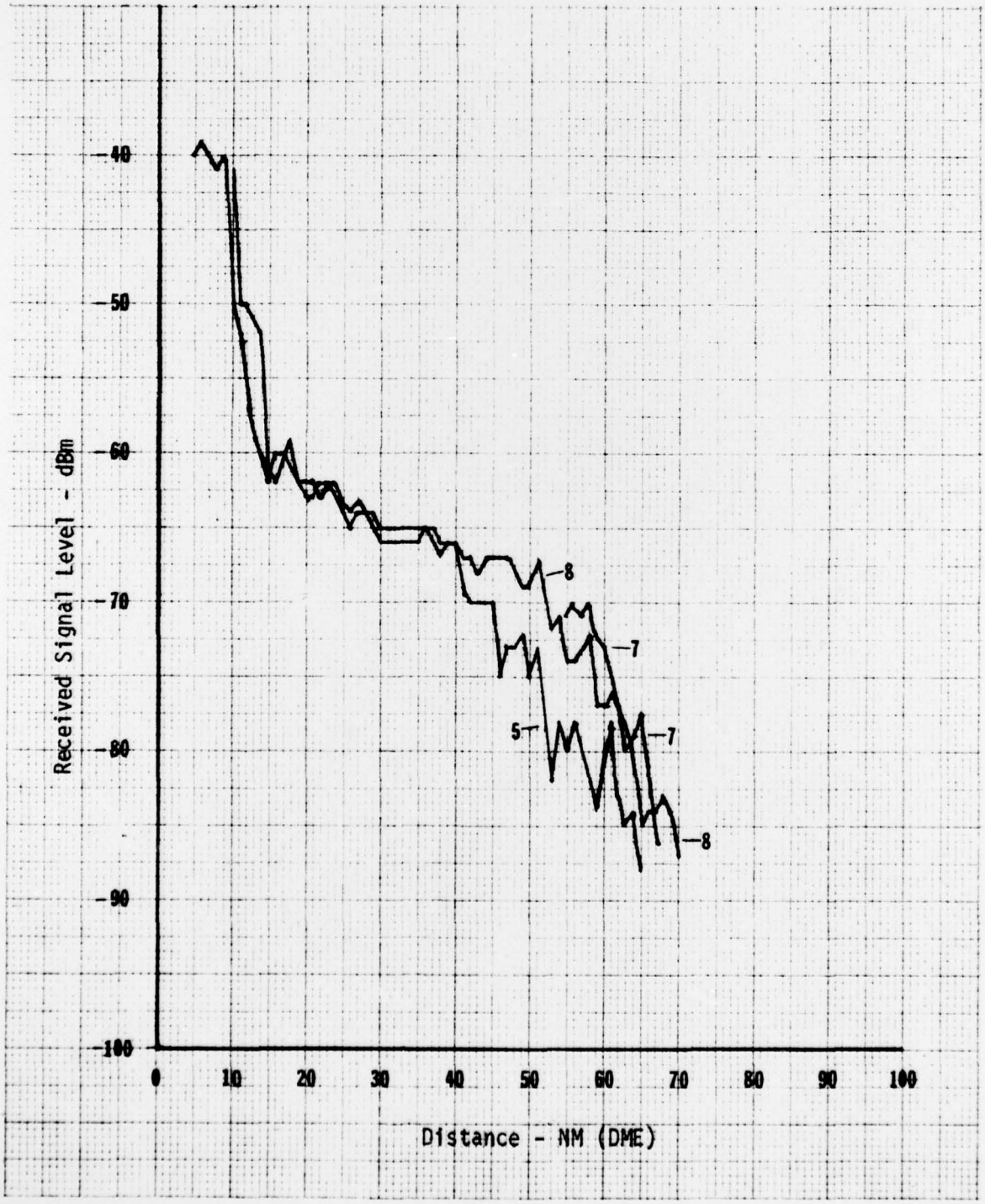
Altitudes are expressed in thousands of feet MSL.

TITLE:

TACAN ACTUAL RECEIVED SIGNAL LEVELS - 274° RADIAL

LOCATION: Wright-Patterson, OH

DATE: Mar 77



REMARKS

Altitudes are expressed in thousands of feet MSL.

AFCS FORM MAY 72 906 GENERAL INFORMATION TAB: F-4

TITLE: COMPUTATIONS FOR PREDICTING TACAN COVERAGE

LOCATION: Wright-Patterson AFB, OH

DATE: Mar 77

Radial	Altitude	Line of Sight Limit	Extension Due to Weather	Signal Level at Cut-off Pt	Extension at -2.5 dB/NM	Predicted -85 dBm Point	Actual -85 dBm Point	% Error LOS	% Error Pred	REMARKS
035°	3000	41	0	-62.4	9.0	49.8	51	-20	-2	
	4000	52	0	-64.5	8.2	60.2	56	-7	+8	
	5000	62	0	-66.0	7.6	69.3	63	-2	+10	
	6000	70	0	-67.2	7.1	77.6	70	0	+11	
	7000	79	1	-68.1	6.8	86.2	85	-7	+1	
	8000	86	1	-68.9	6.4	93.2	83	+4	+12	
155°	3000	29	0	-59.5	10.2	39.2	45	-36	-13	
	4000	39	0	-62.0	9.2	47.9	47	-17	+2	
	5000	48	0	-63.7	8.5	56.0	59	-19	-5	
	6000	55	0	-65.1	8.0	63.5	60	+8	+6	
	7000	63	1	-66.2	7.5	71.4	71	-11	+1	
	8000	70	1	-67.1	7.2	78.0	71	-1	+10	
274°	5000	39	0	-61.9	9.2	47.8	64	-39	-25	
	6000	46	0	-63.4	8.6	54.3	66	-30	-18	
	7000	52	0	-64.6	8.2	60.6	65	-20	-7	
	8000	59	1	-65.6	7.8	67.5	69	-14	-2	
					Averages	Signed		-13	-1	
						Unsigned		15	8	

Screening Angles:

035°	+.25°
155°	+.53°
274°	+.78°

TITLE

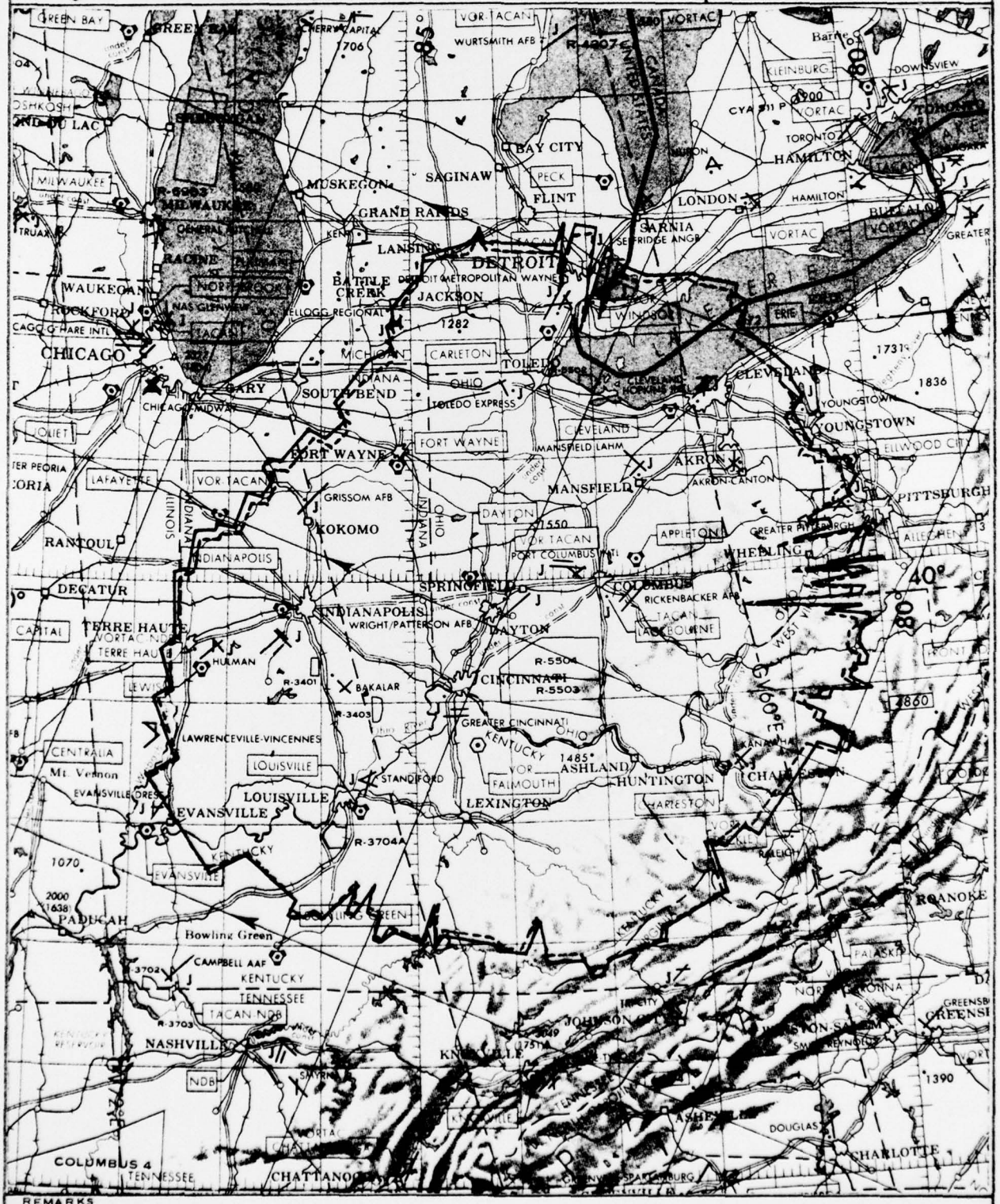
PREDICTED VORTAC -85dBm LIMITS - 30,000 FT MSL

LOCATION

Wright-Patterson AFB, OH

DATE

Mar 77



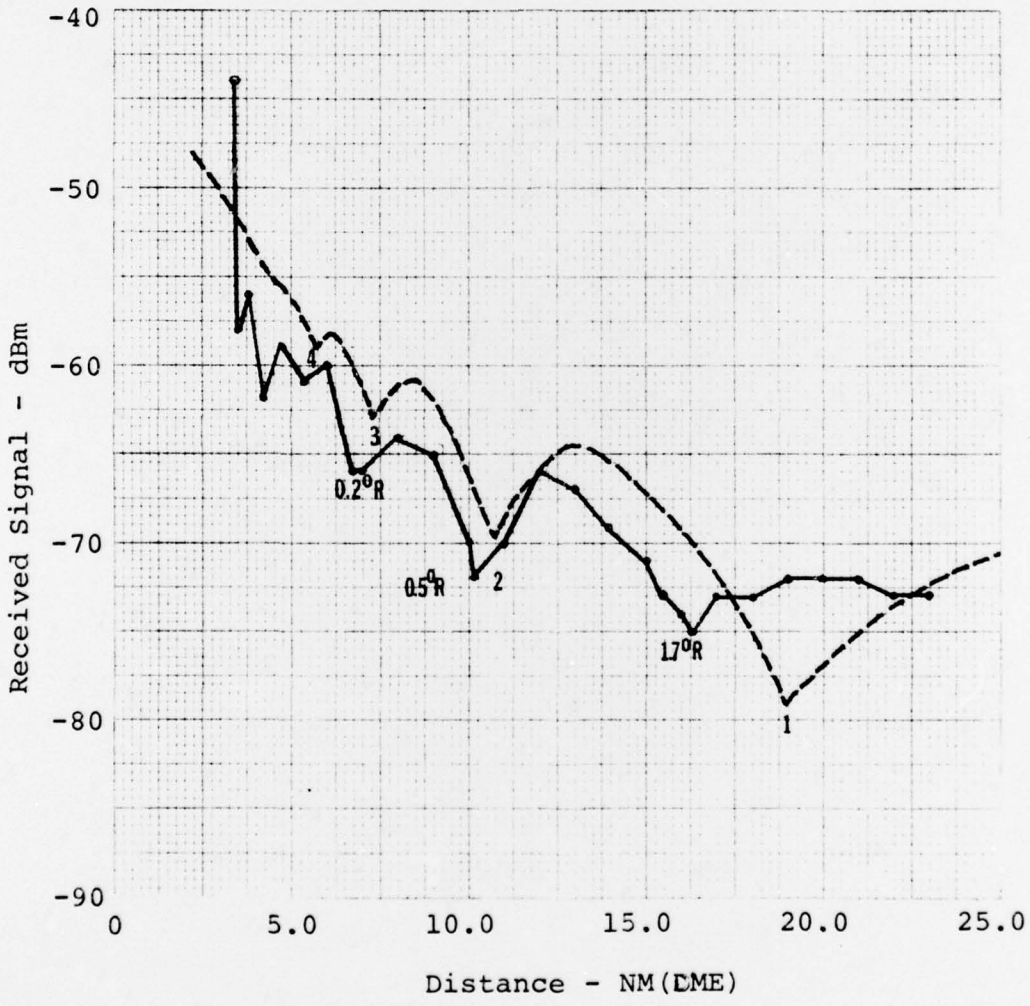
REMARKS

TACAN ———— VOR - - - - - -

TITLE

INTERFERENCE FIELD PATTERN - 047° RADIAL

LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77

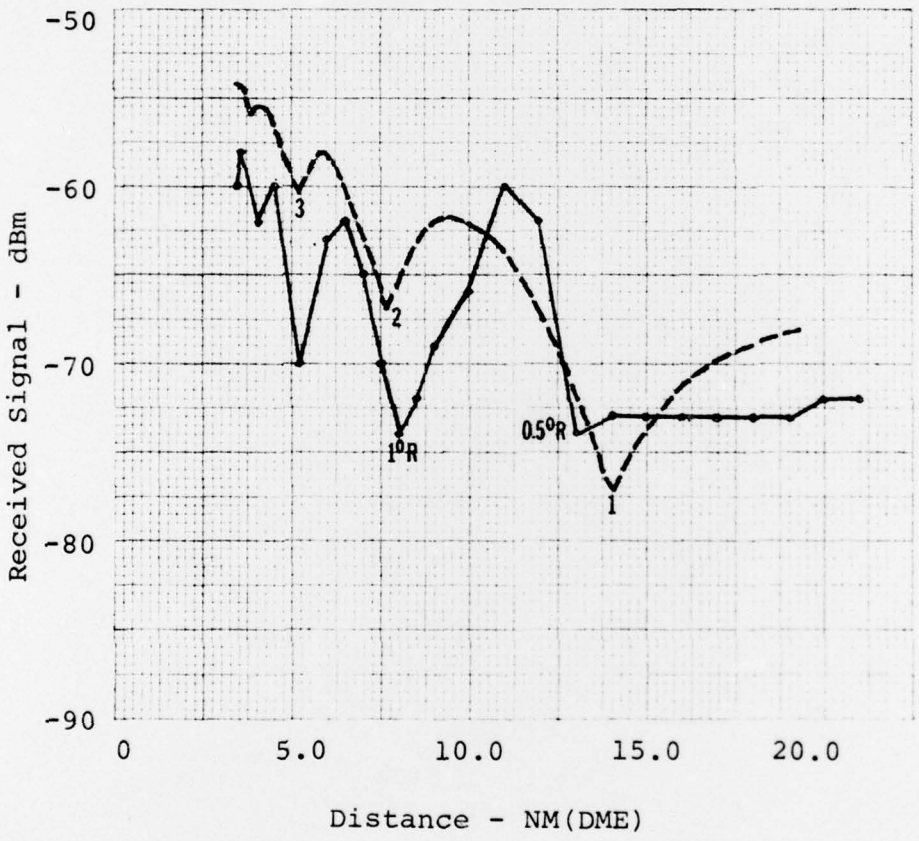


REMARKS

TITLE

INTERFERENCE FIELD STRUCTURE - 047° RADIAL

LOCATION	DATE
Wright-Patterson AFB, OH	Mar 77



REMARKS

TVOR FLIGHT DATA SUMMARY

DATE: Mar 77

LOCATION: Wright Patterson AFB, OH

EQUIPMENT: AN/FRN-31A

UNIT: 2046 Comm Gp

ORBITAL ALIGNMENT ERROR

AZ	TX 1	TX 2	DIFFERENTIAL	AZ	TX 1	TX 2	DIFFERENTIAL
360	2.0	1.7	0.3	180	1.3	2.1	-0.8
350	2.0	1.4	0.6	170	1.4	0.6	0.8
340	1.4	1.4	0.0	160	0.7	0.6	0.1
330	1.3	1.2	0.1	150	0.5	0.5	0.0
320	1.4	1.4	0.0	140	0.5		
310	1.1	1.1	0.0	130			
300	1.0	2.0	-1.0	120			
290	1.5	1.7	-0.2	110			
280	1.0	1.4	-0.4	100	0.3	0.4	-0.1
270	0.7	0.6	0.1	90	0.2	0.0	0.2
260	0.4	0.2	0.2	80	-0.1	-0.2	0.1
250	0.1	-0.4	0.5	70	-0.4	0.0	-0.4
240	-0.1	-0.5	0.4	60	0.7	0.7	0.0
230	0.3	0.0	0.3	50	0.8	1.0	-0.2
220	0.2	0.0	0.2	40	1.5	0.9	0.6
210	0.4	0.4	0.0	30	2.0	2.0	0.0
200	0.7	0.9	-0.2	20	2.0	1.3	0.7
190	1.5	1.6	-0.1	10	2.4	1.5	0.9
			AVERAGE		0.93	0.86	0.41
ERROR SPREAD TX 1: -0.4 TO +2.4 TX 2: -0.5 TO +2.1			CONF LIMITS 99%		± 0.34	± 0.36	± 0.20

RADIAL FLIGHT DATA

RADIAL	USE	TX NO	ALT	DISTANCE		ALIGN ERROR		ROUGH		TX DIF	BENDS	SCLP	POLAR	SIG STR
				FROM	TO	AVE	MAX	AVE	MAX					

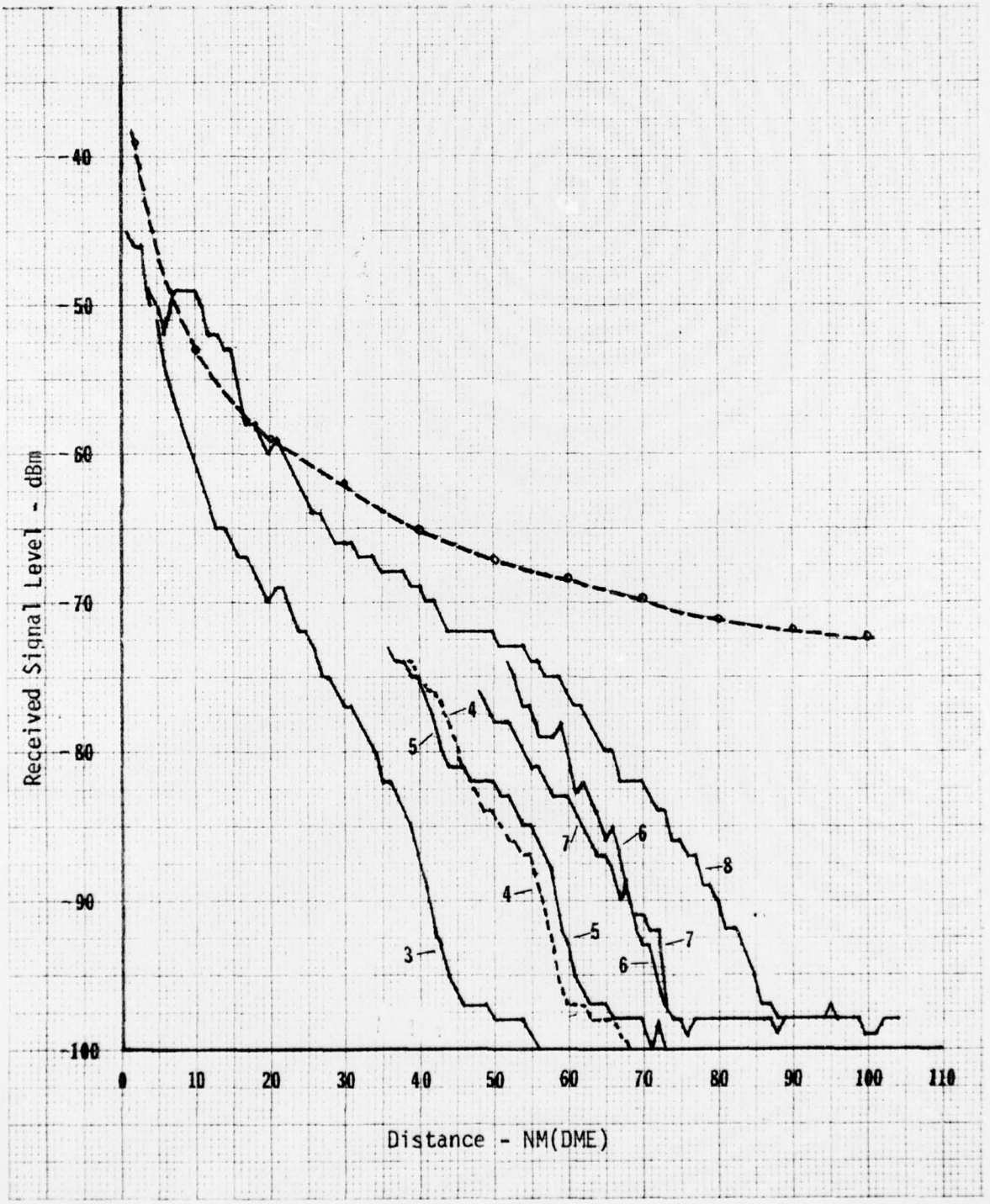
See TABs F-8-1/3

TITLE:

VOR ACTUAL RECEIVED SIGNAL LEVELS - 035° RADIAL

LOCATION: Wright-Patterson, OH

DATE: Mar 77



REMARKS

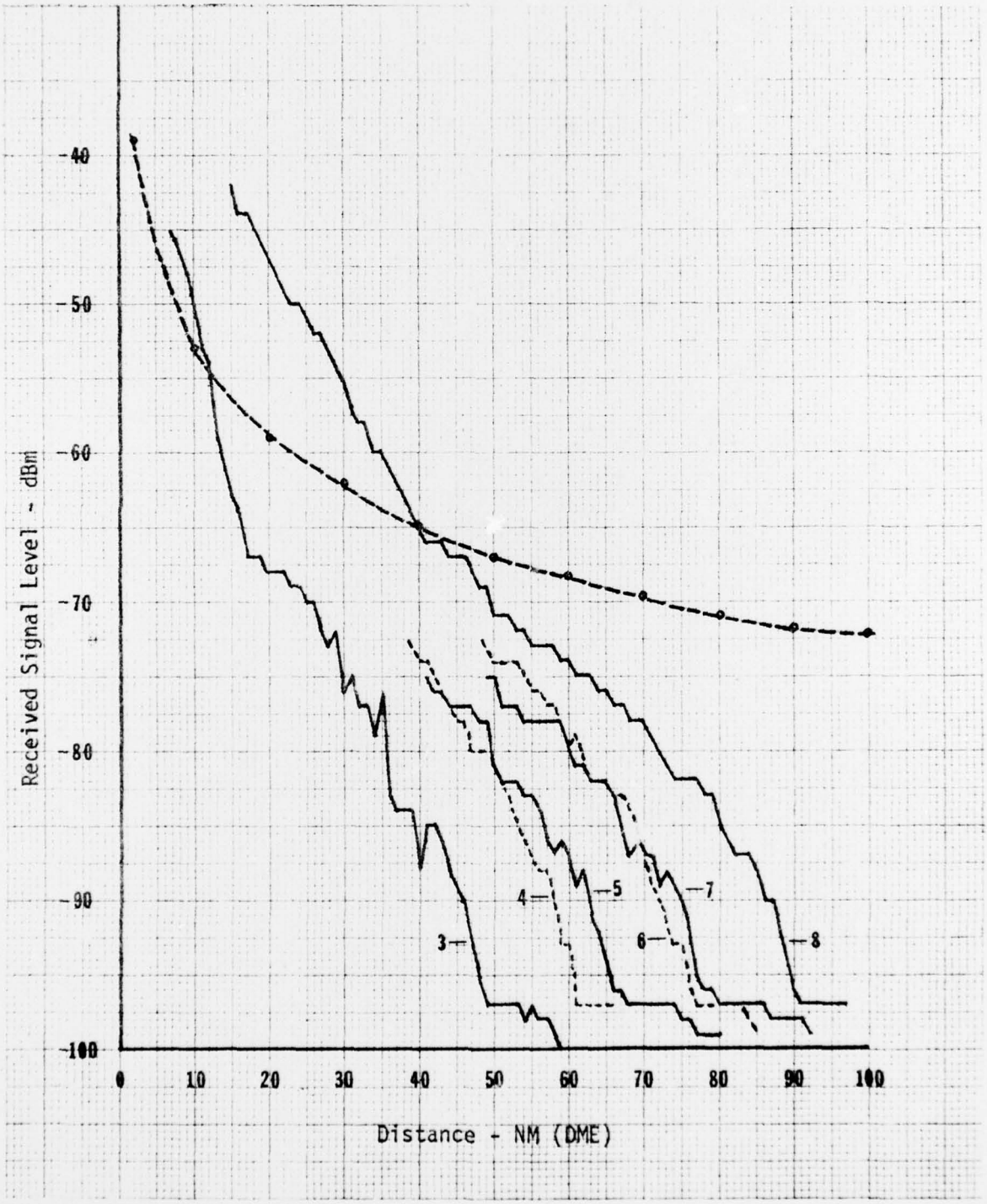
Altitudes are expressed in thousands of feet MSL.

TITLE:

VOR ACTUAL RECEIVED SIGNAL LEVELS - 155° RADIAL

LOCATION: Wright-Patterson, OH

DATE: Mar 77



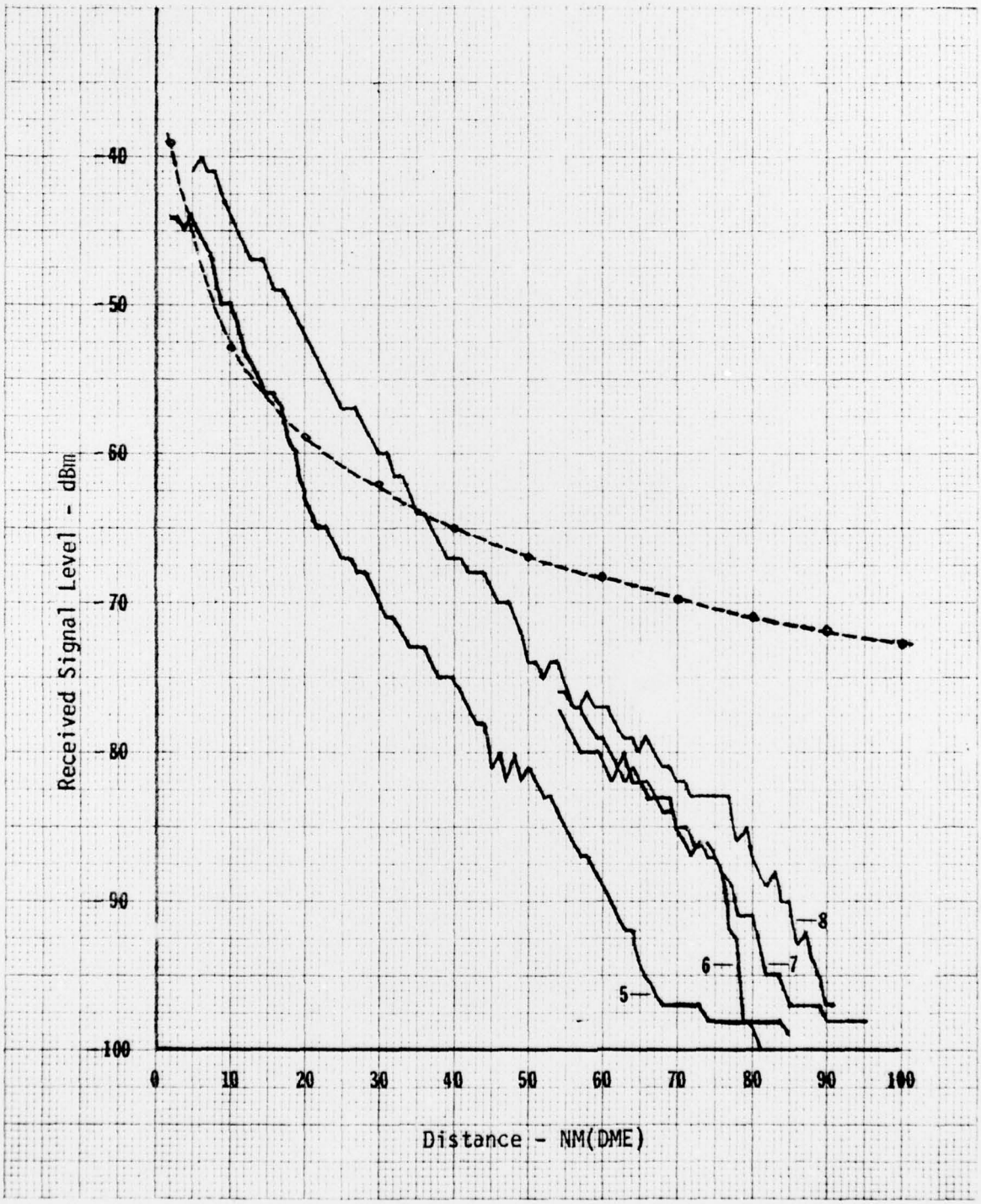
REMARKS

Altitudes are expressed in thousands of feet MSL.

TITLE:
VOR ACTUAL RECEIVED SIGNAL LEVELS - 274° RADIAL

LOCATION
Wright-Patterson, OH

DATE
Mar 77



REMARKS

Altitudes are expressed in thousands of feet MSL.

AFCS FORM MAY 73 906 GENERAL INFORMATION TAB: F-9

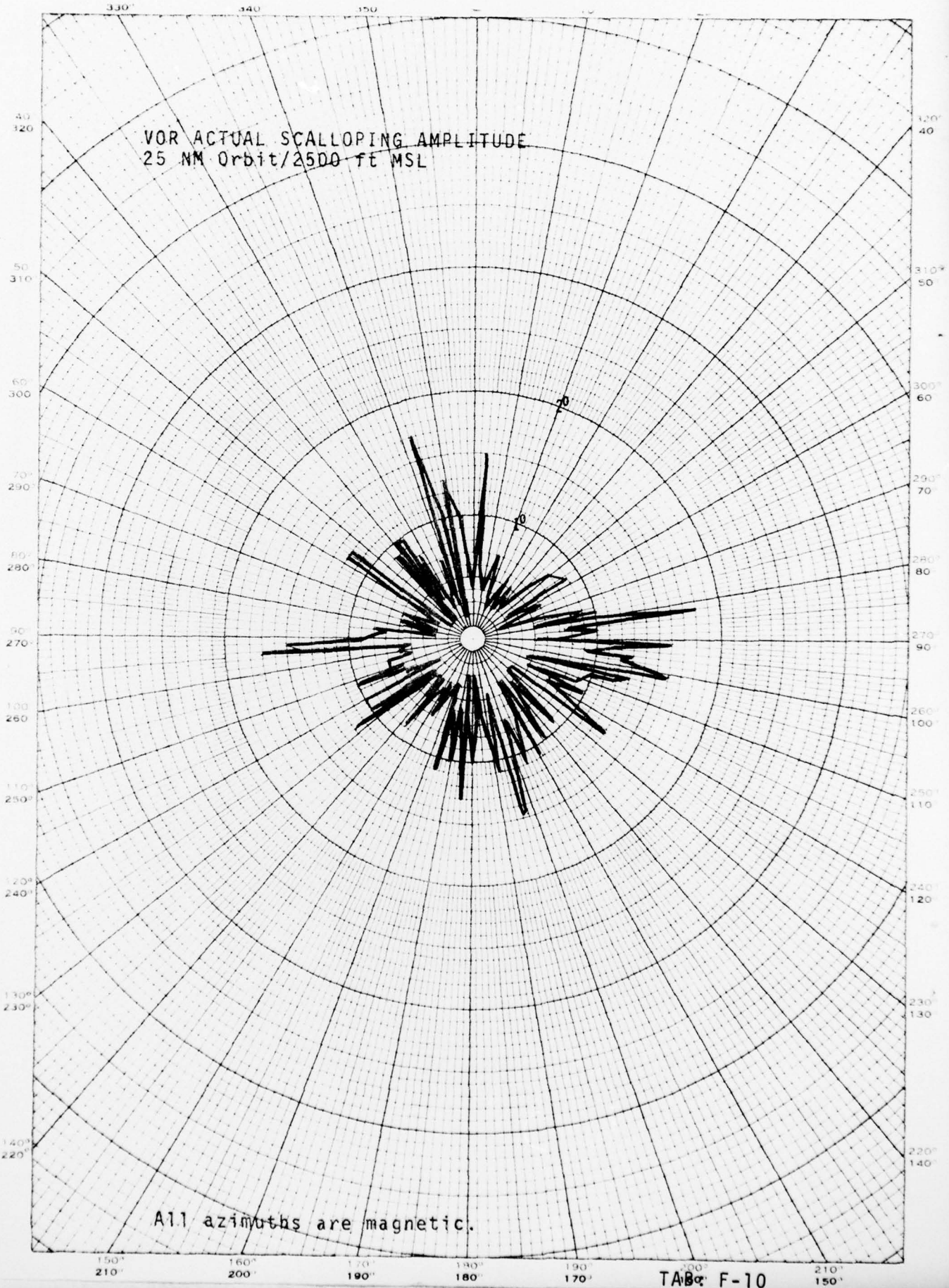
TITLE: COMPUTATIONS FOR PREDICTING VOR COVERAGE

LOCATION: Wright-Patterson AFB, OH

DATE: Mar 77

Radial	Altitude	Line of Sight Limit	Extension Due to Weather	Signal Level at Cut-off Pt	Extension at -2.5 dB/NM	Predicted -85 dBm Point	Actual -85 dBm Point	% Error LOS Pred		REMARKS
035°	3000	41	0	-60.5	9.8	50.8	39.0	-5	-30	
	4000	52	0	-62.5	9.0	61.0	51.0	-2	-20	
	5000	62	0	-64.1	8.4	70.4	55.0	-13	-28	
	6000	70	0	-65.1	8.0	78.0	64.0	-9	-22	
	7000	79	1	-66.1	7.6	87.6	62.0	-27	-41	
	8000	85	1	-66.8	7.3	93.3	73.0	-16	-27	
155°	3000	29	0	-57.5	11.0	40.0	39.0	+26	-3	
	4000	39	0	-60.0	10.0	49.0	53.0	+26	+8	
	5000	48	0	-61.8	9.3	57.3	57.0	+16	-1	
	6000	55	0	-63.0	8.8	63.8	67.0	+18	+5	
	7000	63	1	-64.2	8.3	72.3	69.0	+09	+5	
	8000	70	1	-65.1	8.0	79.0	80.0	+13	+1	
274°	5000	39	0	-60.0	10.0	49.0	55.0	+25	+11	
	6000	46	0	-61.5	9.4	55.4	70.0	+34	+21	
	7000	52	0	-62.5	9.0	61.0	70.0	+26	+13	
	8000	59	1	-63.6	8.6	68.6	78.0	+24	+12	
					Averages		Signed	+9	-6	
							Unsigned	18	15	

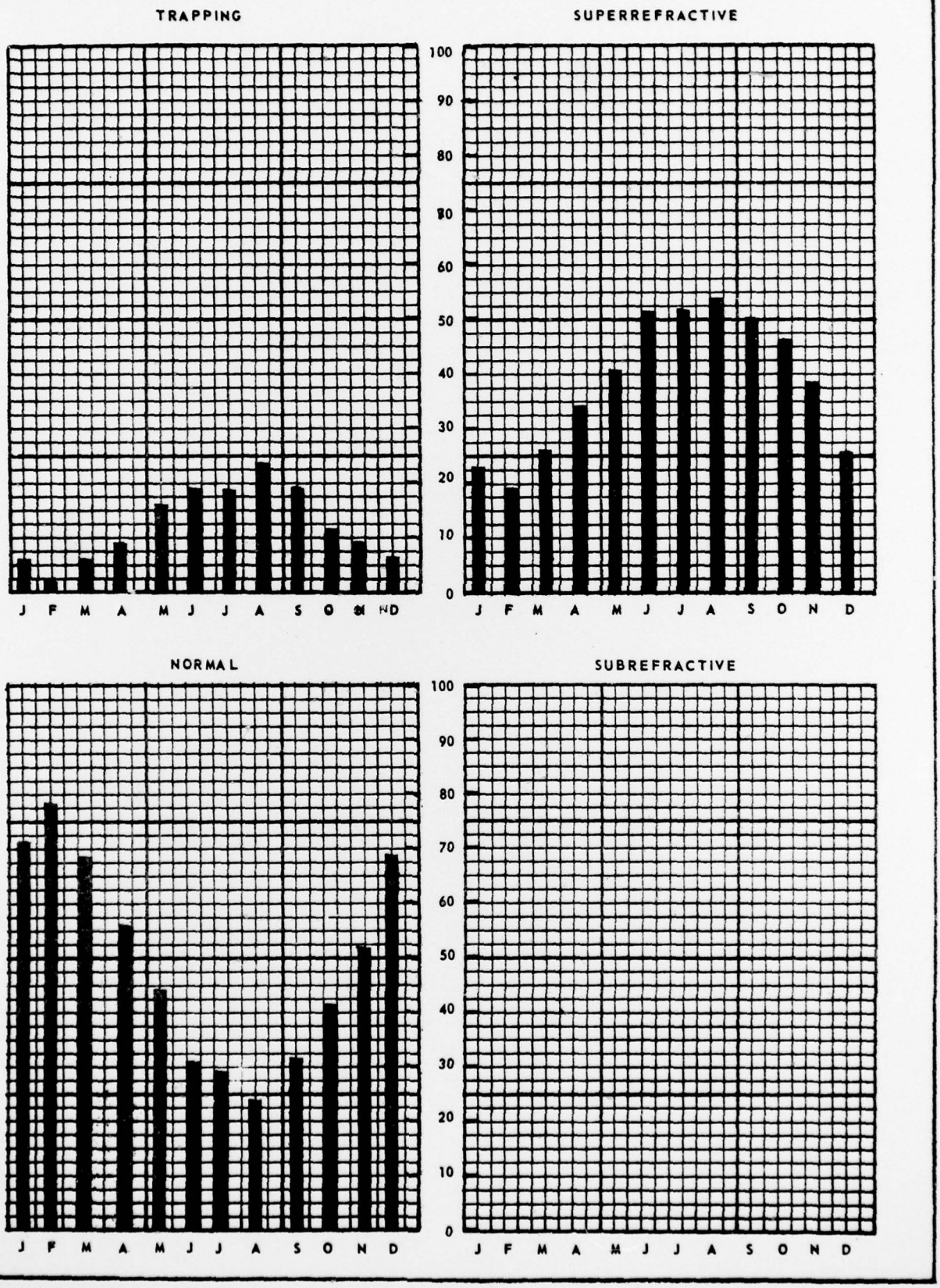
Screening Angles: 035° +.25°
155° +.53°
274° +.78°


VOR ACTUAL SCALLOPING AMPLITUDE
25 NM Orbit/2500 ft MSL
All azimuths are magnetic.

FREQUENCY OF REFRACTIVE CONDITIONS IN PERCENT

NAME OF BASE

WRIGHT-PATTERSON AFB, OHIO



AFCS FORM JUN 73 920

TAB: G-1

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 77/66N-89	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) TRACALS EVALUATION REPORT VORTAC Station evaluation Report Wright-Patterson AFB, OH		5. TYPE OF REPORT & PERIOD COVERED FINAL 15-21 March 1977 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) (Prepared By) Geoffry S. Howard, Capt, USAF		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS 1866 Facility Checking Squadron (AFCS) Richards-Gebaur AFB, Missouri, 64030		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS HQ Air Force Communications Service/FFOT Richards-Gebaur AFB, MO, 64030		12. REPORT DATE 13. NUMBER OF PAGES 114
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Same as report.

18. SUPPLEMENTARY NOTES

None.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

None.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents the results of the 15-21 Mar 1977 evaluation of the Wright-Patterson AFB, AN/FRN-32A VORTAC and associated power systems. The evaluation was conducted to observe the facility in its installed environment and to determine its capabilities and limitations. Results show that the facility is capable of satisfying the users" requirements. Recommendations are made for improvements. The results obtained can be used as a guide to anticipated performance until there is a significant change in either ground equipment,

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